S. HRG. 101-602

# ENERGY POLICY AND CONSERVATION ACT AMENDMENTS OF 1990

## HEARING

BEFORE THE

## COMMITTEE ON ENERGY AND NATURAL RESOURCES UNITED STATES SENATE

ONE HUNDRED FIRST CONGRESS

SECOND SESSION

ON

## S. 2088

TO AMEND THE ENERGY POLICY AND CONSERVATION ACT TO EXTEND THE AUTHORITY FOR TITLES I AND II, AND FOR OTHER PURPOSES

MARCH 20, 1990

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Committee on Energy and Natural Resources

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# ENERGY POLICY AND CONSERVATION ACT AMENDMENTS OF 1990

TUESDAY, MARCH 20, 1990

U.S. SENATE,
COMMITTEE ON ENERGY AND NATURAL RESOURCES,
*Washington, DC.*

The committee met, pursuant to notice, at 2:04 p.m., in room SD-366, Hon. J. Bennett Johnston, chairman, presiding.

## OPENING STATEMENT OF HON. J. BENNETT JOHNSTON, U.S. SENATOR FROM LOUISIANA

The CHAIRMAN. Good afternoon. The committee will come to order.

Our hearing today is on Senate bill 2088, the Energy Policy and Conservation Act Amendments of 1990. I introduced this legislation on February 7 with Senator McClure.

The two major goals of this bill are to enlarge the Strategic Petroleum Reserve to 1 billion barrels and to give the Department of Energy the authority to lease oil for the SPR.

Our nation's dependence on foreign oil is large and is growing. We are now importing 7.6 million barrels a day, about 46 percent of our needs. In January of this year on a one month basis, we went up to 54 percent of our domestic production being imported. Our nation's dependence will likely grow to over 50 percent by the middle of the decade and by 2010, we could well be importing over two-thirds of our oil.

The Strategic Petroleum Reserve is America's first line of defense against a disruption of oil supplies and the damage such a disruption could wreak on our economy and on our national security. It is both the first line of defense—and I might say I think the only line of defense. I do not know what else we are doing in this country to solve the energy crisis other than SPR.

The SPR has enjoyed strong bipartisan support over the last 15 years. In fact, it is one of the few aspects of U.S. energy policy upon which virtually everyone agrees. I have long maintained that the SPR should be able to provide at least 90 days of oil imports, and many of my colleagues concur in that.

The reserve currently holds 580 million barrels which is less than 80 days of imports. Even if we fill at the current rate—or fill to the current maximum limitation of 750 million barrels, imports will continue to grow and the 90 day goal will still not be met. We must set our sights on a 1 billion barrel SPR, if we are to offer adequate protection against the threat of an oil supply disruption.

The SPR was created with a 1 billion barrel goal in mind. That is when imports were much less than they are now. And study after study has supported that target. However last month the Department of Energy issued a report that recommended against a 1 billion barrel reserve, saying that the current target of 750 million barrels is adequate.

The message from the administration is, "Don't worry be happy," with a smaller SPR, a weaker insurance policy, a shorter lifeline for this country if oil supplies are threatened.

I might say that I have seen administration after administration—Democratic and Republican—always wanting not to spend money on SPR, because the attitude is always to fill SPR with today's dollars, my dollars—if you are President—whereas the disruption is somebody else's problem. It has been like that all along. And it has always been wrong under both Democratic and Republican administrations. And it is today.

With all there is at risk, and the uncertainty over future oil supplies, I do not believe we can afford that kind of complacency. We should worry about the economic and national security implications of a sudden shortage of oil. We should not be happy with a policy that lessens our ability to cope with that kind of shock.

This legislation will provide the insurance we need to guarantee that our economy will not be crippled and that our national security will not be endangered by a sudden interruption of oil supplies. It directs DOE to create a 1 billion barrel Strategic Petroleum Reserve.

Protecting our nation against the threat of an oil disruption has never been cheap. However, the second major provision of this bill would allow DOE to lease oil. This option could significantly lower the cost of filling the SPR. Indeed it would cost only a fraction of what it costs to do it through purchase. My staff has conducted a preliminary analysis which indicates that the leasing could cut the cost of filling the SPR in half.

Last year the Congress directed the department to study alternative financing methods for the SPR, including leasing. That study was also issued last month. In his transmittal letter Admiral Watkins endorsed oil leasing. I hope that working together we can bring this proposal to fruition.

We have an expert panel here today. I look forward to spirited debate on these issues. My distinguished colleague, Senator Inouye is still at the caucus. And we will interrupt for his testimony when he returns.

In the meantime I would like to introduce a very distinguished panel involving the Honorable Robert H. Gentile, Assistant Secretary for Fossil Energy in the Department of Energy; Dr. Robert Reischauer, Director of the Congressional Office; my good friend, Leighton Steward, he is Chairman of the Board and CEO of The Louisiana Land and Exploration Company and Dr. Philip K. Verleger, Visiting Fellow, an oil economist of the Institute of International Economics here in Washington.

Gentlemen, if you would all come to the podium. We shall proceed.

[The prepared statements of Senators Johnston and McClure and the text of S. 2088 follow:]

**WRITTEN STATEMENT - SEN. JOHNSTON**
**HEARING ON S. 2088**
**THE ENERGY POLICY AND CONSERVATION ACT AMENDMENTS OF 1990**
**MARCH 20, 1990**

Today's hearing is on Senate Bill 2088, the Energy Policy and Conservation Act Amendments of 1990. I introduced this legislation on February 7. Sen. McClure co-sponsored the bill. It would make two major policy changes: expand the Strategic Petroleum Reserve (SPR) to one billion barrels and authorize oil leasing to fill the Reserve.

On August 15, all the authority in current law for operating and building the SPR will expire (assuming the likely event of House and Presidential approval of S. 2231 providing a short-term extension until that date). The SPR now contains about 580 million barrels of crude oil stored in salt domes in Louisiana and Texas. It is essential that the authority be extended for the SPR, which is contained in Title I of the Energy Policy and Conservation Act (EPCA), and for Title II of EPCA, which authorizes our nation's cooperation with the International Energy Agency under the 1974 International Energy Agreement.

The need to extend EPCA offers an excellent opportunity to make important changes in SPR policy. Nearly all of these changes have been supported by this Committee in the past. First, the legislation extends for 3 years the basic authority for Titles I and II of EPCA.

Second, the legislation would extend through Fiscal Year 1993 the requirement in EPCA that the President "carry out petroleum acquisition, transportation, and injection activities at the highest practicable fill rate achievable, subject to the availability of appropriated funds." This provision has ensured that the executive branch used appropriated funds to fill the SPR as fast as funds permitted.

Third, this bill directs DOE to expand the SPR to 1 billion barrels. The legislation that first created the Reserve called for a size of up to 1 billion barrels. Unfortunately, no administration ever developed plans for an SPR beyond 750 million barrels. Many, including Don Hodel when he was Energy Secretary, have advocated that the SPR should contain at least 90 days of net U.S. oil import. Several years ago, some in the Reagan administration argued that if the United States had 90 days of supply in the SPR, it was sufficient, and we did not need to complete the plans for a 750-million barrel SPR. Today, even if we wanted to limit the SPR to 90 days of imports, U.S. oil imports are growing so fast that we will need more than 750 million barrels of oil in the SPR in order to maintain that 90 days of supply.

Once the SPR reaches 750 million barrels, that stored oil

will represent 90 days of net U.S. oil imports only if such imports do not exceed 8.3 million barrels per day. The latest Energy Information Administration [EIA] base case forecast projects that our imports will easily exceed that level by 1995. EIA projects imports of 9.1 million barrels per day in that year. Even in EIA's high oil price scenario, in which oil consumption is held relatively low, imports would be greater than 8.3 million barrels a day by the year 2000.

Under the EIA forecasts, even a 1-billion SPR would not provide 90 days worth of imports in 2000 in EIA's low oil price scenario. So it is reasonable and prudent to develop a one billion barrel SPR. Given the long leadtimes required for building storage facilities, it is time to start planning now. DOE experts think the environmental impact statement by itself might take 1 or 2 years.

The proposed legislation requires the Secretary of Energy to amend the existing SPR reserve plan to prescribe his plans for a 1-billion barrel SPR. If he does not do so by January 30, 1991, then oil production from the Naval Petroleum Reserve at Elk Hills will be shut in. This is a fairly drastic sanction, but it is one that the Congress has used repeatedly and successfully with respect to the SPR.

On February 1, the Department of Energy submitted a study prepared by the Interagency Working Group on SPR Size. The Study concluded that expansion to one billion barrels was neither needed nor justified. This is in sharp contrast to many previous studies which have concluded that the optimal SPR size is 1-2 billion barrels. Most recently, a 1988 study by the Oak Ridge National Laboratory found that 1 billion barrels is preferable to 750 million barrels.

My staff has reviewed the new size study. Their initial observations indicate that the study assumed very low probabilities of major oil disruptions and made very optimistic assumptions about the availability of other reserves and excess production capacity during a disruption. Furthermore, the study did not explore the possibility of reducing the cost of filling the SPR by leasing oil from foreign producers, a method that could result in substantial cost savings. My staff has conducted a preliminary analysis of the potential savings from oil leasing that indicates that the cost of going to a billion barrels may be cut in half. I remain convinced that a 1 billion barrel SPR is a wise investment and look forward to a detailed review of the new size study at today's hearing.

Fourth, this legislation addresses the SPR fill rate. Under current law the SPR must be filled at no less than 75,000 barrels per day until 750 million barrels are in storage. In the fiscal year 1989 and 1990 appropriations bills this requirement was

waived. The proposed legislation continues the 75,000 barrel per day requirement until 1 billion barrels are in storage. A much higher fill rate can certainly be justified. Even with our ongoing budget difficulties, a fill rate of 75,000 barrels per day should be viewed as a bare minimum. Alternative financing mechanisms may help -- a subject I will turn to in a moment.

Fifth, the proposed legislation contains a provision for the predrawdown diversion of SPR oil. Under current law, if an oil disruption occurred, any oil already purchased for the SPR and en route for delivery must first be placed in the SPR before being sold. It would be more efficient to allow that oil to be sold while in transit and sent directly to a refinery instead of being deposited in the SPR and then withdrawn.

Sixth, besides the authorities on the SPR, Titles I and II of EPCA also contain other authorities, notably those that authorize cooperation with the International Energy Agency as well as various discretionary energy authorities. All of these would be extended to September 30, 1993 under this bill.

Finally, the bill contains provisions that, in the view of the Department of Energy (DOE), would be necessary in order to authorize the long-term leasing of crude oil and storage facilities. Leasing is a promising method of achieving the goals of the SPR program despite the severe budgetary constraints facing the Federal government. DOE submitted drafts of these provisions in February as required by Public Law 101-46. In his accompanying, Secretary Watkins recommended that Congress authorize but not require oil leasing. The legislative language provided by DOE deserves close examination as the Committee on Energy and Natural Resources considers this bill. I have included that language in the bill to stimulate a thorough such examination.

OPENING STATEMENT
SENATOR JAMES A. McCLURE (R-ID)
COMMITTEE ON ENERGY AND NATURAL RESOURCES
TUESDAY, APRIL 20, 1990 (2:00 P.M.)

STRATEGIC PETROLEUM RESERVE

Good morning. On many occasions since the 1973 Arab oil embargo, I have spoken on the adequacy of the United States' energy emergency preparedness. I have emphasized that national policies in this critical area must be dynamic, not static. And I have observed that the cornerstone -- indeed, the only facet -- of our energy emergency preparedness is the Strategic Petroleum Reserve.

Fourteen years have passed since the Congress authorized the Strategic Petroleum Reserve. Successful completion of the Reserve was considered a monumental task by all concerned. By the end of this year, due to the support and dedication of many individuals, the SPR will contain over three-quarters of the currently authorized 750 million barrel Reserve.

S. 2088 extends these critical authorities for an additional three years. Similar legislation which passed the Senate last year authorized the fourth 250 million barrels of SPR storage, as originally envisioned by the Congress in 1976. At the time, the House Energy and Commerce Committee assured this Committee of its support for this authorization. We also were assured of their approval early in this session. I hope that they are prepared to meet this commitment.

If current trends in oil imports continue in the near future -- and there is nothing to suggest they will not -- the United States could fail to meet its IEA obligations. If this were to occur it would significantly undermine the United States' credibility and leadership in this vital area. I say this recognizing that the Administration does not at this time support further expansion of the Reserve.

Another provision of the measure would authorize the diversion of SPR oil in transit for storage in the Reserve when the President anticipates that international oil markets will deteriorate into a severe international energy supply problem. While diversion of oil in transit can be justified under such circumstances, I question the advisibility of a more extensive change in SPR policy that would permit use of SPR oil in other than an international energy shortage; for example, in the event of a tanker or pipeline accident. Existing statutory authority is quite clear on his point; it does not permit SPR drawdown short of an actual severe energy supply disruption or by obligations of the U.S. under the Agreement on and International Energy Program.

Over the years, this Committee has examined alternative mechanisms other than direct appropriations to finance the Reserve. Each financing method discussed has had its strengths and weaknesses. Under current law, drawdown is controlled by the President based on national energy security

and economic concerns and I believe that such Presidential control must be retained.

Last year's amendments authorized DOE to study alternative mechanisms for financing the SPR, with particular emphasis on leasing. In light of the present budgtary climate, it is particularly appropriate that the Committee, at this time, consider such an alternative financing measures and I look forward to the testimony of today's witnesses.

I

101ST CONGRESS
2D SESSION

# S. 2088

To amend the Energy Policy and Conservation Act to extend the authority for titles I and II, and for other purposes.

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IN THE SENATE OF THE UNITED STATES

FEBRUARY 7 (legislative day, JANUARY 23), 1990

Mr. JOHNSTON (for himself and Mr. MCCLURE) introduced the following bill; which was read twice and referred to the Committee on Energy and Natural Resources

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# A BILL

To amend the Energy Policy and Conservation Act to extend the authority for titles I and II, and for other purposes.

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,*

**SEC. 1. SHORT TITLE.**

That this Act may be referred to as the "Energy Policy and Conservation Act Amendments of 1990".

**SEC. 2. EXTENSION OF AUTHORITY.**

The Energy Policy and Conservation Act (42 U.S.C. 6211 et seq.) is amended—

(a) in section 104(b)(1) by striking out "April 1, 1990" and inserting in lieu thereof "September 30, 1993";

(b) in section 171, by striking out "April 1, 1990" each place it appears and inserting in lieu thereof "September 30, 1993"; and

(c) in section 281, by striking out the term "June 30, 1990" each place it appears and inserting in lieu thereof "September 30, 1993".

SEC. 3. ENLARGEMENT OF SPR TO ONE BILLION BARRELS.

(a) Section 159 of the Energy Policy and Conservation Act (Public Law 94–163), as amended (42 U.S.C. 6239), is amended by adding the following new subsection:

"(i) The Secretary shall by January 30, 1992, amend the Strategic Petroleum Reserve Plan to prescribe plans for completion of storage of one billion barrels of petroleum products in the Reserve. Such amendment shall comply with the provisions of this section and shall detail the Secretary's plans for the design, construction, leasing or other acquisition, and fill of storage and related facilities of the Reserve to achieve such one billion barrels of storage. Such amendment shall not be subject to the congressional review procedures contained in section 551 of Public Law 94–163 (42 U.S.C. 6421). In assessing alternatives in the development of such

plans, the Secretary shall consider leasing privately owned storage facilities.".

(b) Section 160 of the Energy Policy and Conservation Act, as amended (42 U.S.C. 6240), is amended—

(1) by substituting in paragraph (c)(3)—

(A) the term "fiscal year 1993" for the term "fiscal years 1988 and 1989", and

(B) the term "1,000,000,000" for the term "at least 750,000,000", and

(2) in paragraph (d)(1)—

(A) by substituting in subparagraph (A) the term "$1,000,000,000" for the term "750,000,000", and

(B) by striking the period at the end of subparagraph (B), substituting a semicolon, and adding a new subparagraph (C) as follows:

"(C) after January 30, 1991, the Secretary has amended the Strategic Petroleum Reserve Plan as required by section 159(i).".

**SEC. 4. PREDRAWDOWN DIVERSION OF SPR OIL.**

Section 161 of the Energy Policy and Conservation Act, as amended (42 U.S.C. 6241), is amended by adding the following new subsection:

"(h)(1) If the President finds that a severe energy supply interruption may be imminent and that the world price

of crude oil has, as a result, increased substantially, then the execution of new contracts for petroleum products for injection into the Strategic Petroleum Reserve may be curtailed or suspended for a period not to exceed thirty days, and the provisions of sections 160 (c) and (d) shall not apply: *Provided, however,* That the President may extend such finding for additional thirty-day-periods if he finds that the conditions that justified the initial finding still exist.

"(2) The period during which such Presidential finding is in effect, and the quantity of any petroleum products involved, shall be disregarded in applying the provisions of such subsections for periods following the effective period of such finding.

"(3) When such a finding is in effect, the Secretary is authorized to sell, in accordance with rules or regulations which he shall promulgate, any petroleum products acquired for storage in, but not injected into, the Strategic Petroleum Reserve.

"(4) The receipts from such sales shall be deposited in the 'SPR Petroleum Account' under section 167 and shall be subject to section 167(d).".

**SEC. 5. LEASING AUTHORITY.**

(a) Title I of the Energy Policy and Conservation Act is amended by adding the following new part after Part B and redesignating parts and sections accordingly:

"PART C—SUPPLEMENTARY OIL RESERVE

"SEC. 171 DECLARATION OF POLICY.

"(a) The Congress finds that budgetary constraints have hindered completion of a one billion barrel Strategic Petroleum Reserve, and that establishment of a Supplementary Oil Reserve can help diminish the vulnerability of the United States to the effects of a severe energy supply interruption, and contribute to the effectiveness of the international energy program.

"(b)(1) It is hereby declared to be the policy of the United States, to the extent consistent with the Strategic Petroleum Reserve program, to encourage supplementation of the Strategic Petroleum Reserve and other domestic petroleum product stocks by contracting for Supplementary Oil Reserve storage of petroleum products in, or readily accessible to, the United States by private firms or foreign governments in facilities not owned by the United States, and by contracting for Supplementary Oil Reserve storage in Government-owned facilities.

"(2) The purpose of this part is to add to the Secretary's existing authority under part B to contract for petroleum products and storage and related facilities for the Strategic Petroleum Reserve by authorizing the Secretary to contract for Supplementary Oil Reserve storage in facilities other than those of the Strategic Petroleum Reserve, and for Supple-

mentary Oil Reserve storage, in otherwise unused Strategic Petroleum Reserve storage facilities, of petroleum products owned by any person or government.

"(3) It is the policy of the United States that the authorities provided by this part shall be used as a complement to the Strategic Petroleum Reserve and not in any manner which reduces the effectiveness, of, or diminishes the control of the President and the Secretary over, the drawdown or distibution of the Strategic Petroleum Reserve.

"SEC. 172 DEFINITIONS

"Terms used in this part have the same meaning that they have in part B.

"SEC. 173 CONTRACTING FOR PETROLEUM PRODUCTS AND FACILITIES.

"(a) The Secretary may contract for Supplementary Oil Reserve storage, in storage facilities other than those of the Strategic Petroleum Reserve, of petroleum products not owned by the United States.

"(b) Petroleum products stored under such a contract are subject to the Secretary's authority under section 161 (except sections 161 (e) and (g)) to draw down and distribute petroleum products, as if those petroleum products were in the Strategic Petroleum Reserve.

"SEC. 174. USE OF STRATEGIC PETROLEUM RESERVE FACILITIES.

"(a) The Secretary may contract for Supplementary Oil Reserve storage, in otherwise unused Strategic Petroleum Reserve facilities, of petroleum products not owned by the United States, to the extent consistent with the purposes of Part B and of this part. A contract entered into under this section shall not limit the discretion of the President or the Secretary to conduct a drawdown and distribution of the Strategic Petroleum Reserve.

"(b) Petroleum products stored under any such contract are subject to the authority of the Secretary under section 161 (except sections 161 (e) and (g) to draw down and distribute petroleum products, as if those petroleum products were in the Strategic Petroleum Reserve.

"(c) The Secretary may store petroleum products under this section with or without charge, or pay a fee for their storage.

"SEC. 175. STRATEGIC PETROLEUM RESERVE TIE-IN.

"(a) If the Secretary determines that one or more contracts or proposed contracts for Supplementary Oil Reserve storage of petroleum products under section 173 or 174 would for their duration achieve benefits comparable to equivalent storage of petroleum products in the Strategic Petroleum Reserve and that, because of budgetary constraints, equivalent storage of petroleum products in the Strategic Pe-

troleum Reserve cannot be accomplished, the Secretary may so notify each House of the Congress, including in his notification the same information required under section 154(e) with regard to storage and related facilities proposed to be included, or petroleum products proposed to be stored, in the Strategic Petroleum Reserve. From sixty calendar days after notification, all petroleum products actually stored under such a contract shall be counted as part of the Strategic Petroleum Reserve for purposes of part B.

"(b) Petroleum products counted as part of the Strategic Petroleum Reserve under this section, if otherwise eligible, qualify to satisfy any applicable provisions for Regional Petroleum Reserves or noncontinuous storage under part B.

"(c) Notwithstanding any other law, the expiration of a contract for the storage of petroleum products under section 173 or 174 is not a violation of any requirement concerning the size or rate of fill of the Strategic Petroleum Reserve. For purposes of section 160(d), the reduction in the quantity of crude oil in storage in the Strategic Petroleum Reserve attributable to expiration of such a contract is considered to occur between the end of the fiscal year in which expiration actually occurs and the beginning of the following fiscal year.

**"SEC. 176. WAIVER OF FILL REQUIREMENTS.**

"Sections 160 (c) and (d) do not apply for a given fiscal year if, during that fiscal year, the President transmits to the

Congress a written certification that a good faith effort has been or is being made, using the authorities in this part, to achieve Supplementary Oil Reserve storage which, together with fill of the Strategic Petroleum Reserve, utilizes or would utilize substantially all appropriations available for these purposes.

"SEC. 177. IMPLEMENTATION.

"(a) Notwithstanding subsection 160(c), the Secretary may use, for the acquisition of petroleum products or of petroleum product storage under this part, without further appropriation, funds available for the planning, administration, acquisition, and construction of storage and related facilities of the Strategic Petroleum Reserve, and funds available for the acquisition, transportation, and injection of petroleum products into the Strategic Petroleum Reserve. For the purposes of this section, the acquisition of petroleum products includes payments of amounts due upon the expiration, termination or other conclusion of the acquisition contract.

"(b) The Secretary, as consideration for the storage of petroleum products in the Supplementary Oil Reserve, may allow the additional storage, in Strategic Petroleum Reserve facilities or in facilities contracted for under section 173, of petroleum products for commercial purposes.

"(c) The Secretary, in any contract entered into under this part, may provide for the acquisition by purchase or ex-

change of stored petroleum products by the United States, for storage in, or use in connection with, a drawdown and distribution of petroleum products from the Strategic Petroleum Reserve.

"(d) An amendment of the Strategic Petroleum Reserve Plan is not required for any action taken under this part.

"(e) Petroleum products stored and facilities used in the Supplementary Oil Reserve have the same status as petroleum products and facilities owned by the United States for all purposes associated with the exercise of the laws of any State or political subdivision thereof.

"(f) Contracts under this part may be of such duration as the Secretary considers necessary or appropriate.".

(b) Section 159 of the Energy Policy and Conservation Act is amended by adding the following new subsection:

"(i) A storage or related facility of the Strategic Petroleum Reserve owned by or leased to the United States is not subject to the Interstate Commerce Act.".

○

The CHAIRMAN. Secretary Gentile, I believe this is your first time to testify as Secretary before the committee. Is it not?

Mr. GENTILE. It certainly is, Mr. Chairman.

The CHAIRMAN. Well, congratulations on your confirmation which we strongly backed and we are quite confident of. And we are delighted to have you. And if you would like to begin, we would be glad to hear from you.

Your statement will be placed into the record, and we would like for you to summarize it. So with that in mind, please proceed.

**STATEMENT OF ROBERT H. GENTILE, ASSISTANT SECRETARY, FOSSIL ENERGY, DEPARTMENT OF ENERGY, ACCOMPANIED BY RICHARD FURIGA, DEPUTY ASSISTANT SECRETARY, PETROLEUM RESERVES; HOWARD BORGSTROM, DIRECTOR, OFFICE OF PLANNING AND FINANCIAL MANAGEMENT; GUY CARUSO, DIRECTOR, OFFICE OF ENERGY EMERGENCY POLICY AND EVALUATION; M. McELWRATH, PRINCIPAL DEPUTY ASSISTANT SECRETARY, FOSSIL ENERGY; AND JOHN BARTHOLOMEW, DIRECTOR, OFFICE OF STRATEGIC PETROLEUM RESERVE**

Mr. GENTILE. Mr. Chairman, it is my pleasure to appear before you today, and I will submit my opening statement for the record. But I would like to summarize.

With me today in the first row are some of the staff of Fossil Energy and also staff from the International Affairs and Energy Emergencies. With your permission I would like to submit my formal statement for the record and summarize a few major points.

As the committee is aware there have been many changes in energy policy in the environment of the United States over the past two decades, yet two themes remain constant. One has been the need to develop and maintain a large energy stock pile of crude oil. The other has been the need to foster international cooperation on energy security issues.

This Administration fully supports these energy policies and that is reflected in our legislative recommendations for Title I and Title II of the EPCA. Both this committee and the House Energy and Commerce Committee have introduced legislation to provide a short term extension of EPCA authorities until August 15 of 1990. This will allow time to resolve the complex issues proposed for a long term extension. We do not object to the short term extension and recommend that the longer extension be until April 1995.

Turning to the question of the size and financing. On February 2 the Department submitted studies to the Congress on the appropriate size of the SPR and the alternative means to finance its construction and fill.

As the size study indicated the Administration believes that a 750 million barrel SPR is an appropriate and prudent oil stockpiling policy for the United States. That decision was unanimously supported by the President's Economic Policy Council. Therefore the administration strongly opposes section 3 of Senate Bill 2088 which would expand the reserve to 1 billion barrels.

The Administration's judgment is that a 750 million SPR provides substantial protection against the range of worst case disruptions. It offers ample deterrence against the probability of current

and future embargoes. This judgment was based on an exhaustive analysis and a broad range of economic, foreign policy and national security factors that are described more fully in the size study.

The key finding of the study is that the additional cost of expanding the Reserve from 750 million to 1 billion far out weigh the incremental benefits. The SPR is already by far the world's largest government owned petroleum stockpile and it will be 750 million barrels. It will continue to be considerably larger than any comparable reserve possessed by our trading allies for well into the foreseeable future.

U.S. SPR stocks today could cover total imports for 81 days. In 1978 the stocks provided less than 10 days in imports. A 750 million barrel Reserve is projected to provide an estimated 74 days of coverage in the year 2000.

When the Reserve is full we will be able to supply crude oil to the market at a rate of 4 million barrels per day for six months. The probability of a disruption of that magnitude for that duration is extremely small.

We have far exceeded our stockpiling commitments under the IEP Agreement. The criterion of 90 days of net imports set by that Agreement includes, not only government owned strategic stocks, but also large portions of the U.S. private sector inventories. With a 750 million barrel SPR we will continue to far exceed our IEA stockpiling commitments for the foreseeable future.

Finally, it is important to recognize that in today's world major disruptions could run counter to the self- interest of both producers and consumers. Many producing nations have made large downstream investments in consumer nations. Any substantial disruption would undermine the profitability of those investments in addition to reducing a producer's market-share of income from oil production.

Mr. Chairman, none of us knows for certain what the energy future will bring. The SPR serves as a very effective hedge against that uncertainty. Quite often people have used the term "insurance policy" to describe the Reserve. And this is very appropriate.

However, the SPR has not been a cheap insurance policy with nearly $20 billion spent to build the facilities and purchase the oil. We estimate it will cost another $6 billion to complete and maintain the 750 million Reserve and yet another $10 billion to $15 billion to expand the Reserve to 1 billion barrels.

Ultimately we must ask whether there might be other ways to use our resources to alleviate energy concerns other than stockpiling oil. As you referred to in your opening statement, Mr. Chairman, we also agree that we must find ways to wean ourselves off of imported oil and do the things necessary in this country to protect our energy security position. That falls in the line of research and development activities on oil, gas and coal and also most certainly in energy conservation and efficiency.

Returning to the insurance analogy, there are better ways to improve our energy health rather than simply buy more health insurance. We must and can reduce our vulnerability to disruptions of foreign oil supplies by combining prudent development of domestic energy resources, improved efficiency and increased use of renewables.

These are some of the questions the Department is currently addressing in the National Energy Strategy. Success in other energy initiatives could not only improve our energy security in the same manner as a large SPR, but also yield day in, day out benefits for the American people. It would benefit our balance of payments and the quality of our environment. Perhaps most importantly, Mr. Chairman, there would be benefits which would accrue whether or not we ever face an interruption of an oil supplies.

Let me turn at this point to the other specific legislative questions posed by Senate Bill 2088 and other bills. First, the option for alternative financing. After reviewing a broad array of alternatives, the Department identified leasing oil from for producing nations with excess production capacity as one option that would reduce the costs of the Reserve.

For the United States there would be the opportunity to obtain access to and control over additional oil supplies. Leasing can provide the same emergency protection as if the oil was owned by the United States Government, but it would not have the budgetary and economic costs outright purchase.

For a producing nation there would be an opportunity to earn financial return by changing the storage location from their natural reservoirs to the SPR caverns. Our current lease authority is constrained because there is no provision for the Government to return the oil to the lessor absent an emergency draw-down.

In the financing study the Department included draft language to give us basic authority to lease oil and/or facilities. The same language is contained in section 5 of the Senate bill.

The Department favors enactment of six of the nine additional authorities set out in the February report. These involve tax relief, procurement law waivers, import charges, export controls, arbitration of disputes and the creation of a Defense Petroleum Inventory. These provisions are discussed in greater detail in my prepared statement.

We also support the inclusion of certain other provisions. Authority for a pre-draw down diversion of incoming cargoes destined for the SPR which could help accelerate the release of oil into the domestic market without the necessity for Presidential drawdown decisions.

We support this provision but believe that some revision should be made in section 4. We have provided the committee with a suitable amendment.

We also support several other amendments to expand SPR authorities. They include a provision that would allow a draw down in response to a severe domestic oil supply disruption. These amendments are described also in my prepared statement.

In summary, Mr. Chairman, the Administration favors a legislative change which will promote a cost effective flexible, 750 million Strategic Petroleum Reserve.

This concludes my opening statement. And I would be happy to take questions later.

[The prepared statement of Mr. Gentile follows:]

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Statement of
Robert H. Gentile
Assistant Secretary for Fossil Energy
United States Department of Energy
before the
Committee on Energy and Natural Resources

It is my pleasure to appear before you regarding issues related to the extension of Titles I and II of the Energy Policy and Conservation Act (EPCA) authorizing the Strategic Petroleum Reserve (SPR) and facilitating United States participation in the International Energy Program (IEP). I will provide for the Committee today the Department's views on appropriate terms for extension of the EPCA authorities, the size of the SPR, Chairman Johnston's bill, S. 2088, which extends both Title I and Title II of the EPCA, and other Administration proposals to expand SPR drawdown authorities.

Extension of EPCA Authorities

In July 1988, Congress enacted an extension of Title II of the EPCA until June 30, 1990, and in June 1989, passed legislation to extend Title I of the EPCA, the authority for the SPR, until April 1, 1990, to allow for consideration of various amendments. Some of these amendments are contained in Chairman Johnston's bill, S. 2088. We support the extension of the authorities contained in Titles I and II and recommend that the length of the extension be until April 1995.

Nevertheless, it is apparent that the issues which must be considered by the Congress are numerous and complex and that a reasonable amount of time must be used in deliberation. For this reason both this Committee and the House Energy and Commerce Committee have voted to report bills to extend both Titles I and II of the EPCA until August 15, 1990. In the interest of establishing permanent legislation that has been fully analyzed and debated, the Department does not object to a short term extension of EPCA and a common expiration date for Titles I and II, as provided for in S. 2231.

Size of the SPR

The appropriate size of the SPR has been the subject of considerable interest and review ever since the inception of the SPR program. Although the storage goals have been revised over the past 15 years, this Administration's policy has been to complete a 750 million barrel SPR by the late 1990's. Public Law No. 101-46 required the Secretary of Energy to transmit a report to Congress on alternative means to finance the SPR. In signing the legislation, the President also directed that an interagency study be undertaken on the appropriate size of the SPR. Both studies were submitted to Congress on February 2, 1990.

The Administration believes that the development of a 750 million barrel SPR is an appropriate and prudent oil stockpiling policy for the United States. The Administration arrived at this decision after undertaking an analysis of a broad range of economic, foreign policy and national security factors. The results of the analysis were reviewed by the President's Economic Policy Council, whose members unanimously supported the 750 million barrel goal.

I would like to share with you, at this time, some of the thinking which has gone into this decision.

First, the United States possesses the world's largest Government-owned petroleum stockpile. The SPR is also one of the largest direct investments by the Federal Government in the energy sector, and serves both as a powerful deterrent against oil supply disruptions and as an effective instrument to minimize damage to the economy if such disruptions should occur. The question before the Congress and the Administration, therefore, is not one of whether to have a large SPR; we have one. Rather, the question is whether expanding the SPR beyond 750 million barrels is necessary or justified.

The Administration believes that expansion beyond the 750 million barrel goal would be inconsistent with current understanding of market and geopolitical conditions and of their evolution during the last decade. Such an expansion would require a diversion of public spending from other DOE programs that also enhance United States energy security, such as research on energy efficiency, fuel flexibility, renewable energy sources and enhanced domestic oil and gas recovery tecnniques. It would also aggravate budgetary constraints, increase U.S. oil imports (purchases of SPR oil) that add to trade imbalances, and possibly serve as a disincentive to the expansion of strategic reserves held by our allies.

Second, expansion of the Reserve beyond the planned level of 750 million barrels is neither cost effective nor likely to measurably affect United States energy security. A key finding of the size study is that the incremental benefits of increasing the SPR from 750 million barrels to one billion barrels are far outweighed by the additional costs. We have far exceeded our stockpiling commitments under the IEP Agreement which in 1974 created the International Energy Agency (IEA). The IEP criterion of 90 days of net imports includes not only government-owned strategic stocks, but also large portions of U.S. private sector inventories. For IEA purposes, United States oil stocks (SPR and private) currently are equivalent to 209 days of net imports. Even though our oil imports are increasing, our SPR is increasing also. With a 750 million barrel SPR we will continue to far exceed our IEA stockpiling commitments for the foreseeable future. Moreover, even in the event of a severe interruption, it is highly unlikely that the United States would lose more than half of its imports.

Further, we believe that the economic effects of a broad range of potential supply disruptions could be mitigated through use of existing and planned strategic stockpiles held by all consuming nations, and especially by IEA member states. The coordinated use of these stocks would provide protection against a range of worst-case disruptions of a magnitude significantly greater than any disruption experienced in the last forty years.

Today, we are substantially better prepared to deal with an oil supply interruption than we were in 1979. By the end of 1990, there will be the potential to offset, for six months, a loss of between 8 and 13 million barrels per day of oil supply, or a maximum of 25 percent of free world oil consumption, assuming all excess capacity, including that in the Middle East, is used. The U.S. SPR alone will provide the capability to offset, barrel for barrel, and for six months, an interruption of 3 million barrels per day. IEA government controlled stocks would add, if necessary, an additional minimum of 2 million barrels per day. Fuel switching and potential incremental supplies from excess world production capacity would provide offsets of between 4 and 7 million barrels of oil.

For reference, the Iranian revolution of 1979 reduced world oil supplies by 3.7 million barrels per day for six months, a loss partially offset by increased production of other nations. U.S. imports from Iran were about 550,000 barrels per day in 1978. This interruption was the largest oil market disruption of the last quarter century. In comparison, the 1973-74 oil embargo reduced world oil supplies by 1.6 million barrels per day for five months. To further place in perspective the maximum total free world offsets of 25 percent, and U.S. coverage capability, the 1973/74 Arab oil embargo eliminated 3.4 percent of consumption, and the 1979 Iranian disruption eliminated 7.6 percent of consumption. By 1999, the U.S. SPR alone will have the capability to offset, barrel for barrel, and for six months, an interruption of 4.0 million barrels per day. Such an interruption would be larger than any experienced in this century.

In the recent size study, participating agencies with foreign policy and national security responsibilities provided an in-depth review of strategic considerations affecting SPR size, such as national security, military preparedness and foreign policy objectives. These strategic and other non-economic factors are now, as they have been in the past, also central to policy decisions on SPR size. Based upon this extensive study, it is the judgment of the Administration that a 750 million barrel SPR provides substantial protection against a range of worst case disruptions and ample deterrence against embargoes. Increasing the SPR to one billion barrels would not materially affect these factors.

Third, because of the discretionary character of expansion beyond 750 million barrels, we need to be prudent in undertaking further investment in the Reserve, carefully weighing the expected budgetary costs against the marginal benefits that a larger SPR might provide. From the analysis we have conducted on the advantages and disadvantages of alternative sizes, it is apparent that the SPR should be evaluated as an insurance

policy. When the anticipation of a range of worst case disruptions is very low, which is our current judgment, the high cost of maintaining insurance above a reasonable level is not justified.

The participating agencies in the Administration's recent study on the size of the SPR have concluded that the chances of a disruption, based on a CIA assessment, of the magnitude requiring expansion from 750 million barrels to a full one billion barrels are not anywhere near high enough to warrant such an expansion.

We recognize that any study that attempts to project thirty years into the future - as was done in the interagency size study - deals with extraordinary uncertainty. Sensitivity analyses were conducted to address this issue, but world events can differ markedly from projected behavior. Consequently, studies can reach differing conclusions by changing analytic assumptions. We believe, however, that the results of the size study analysis are reasonable and objective and represent the study group's best estimates of future market conditions.

Several prior studies used assumptions that resulted in estimated positive net benefits for a 1 billion barrel SPR. The most recent study done by a contractor in 1988 used worst case disruption scenarios smaller that those used in the Administration's study, but with a probability of occurrence 10-30 times greater than the CIA assessment. Also, this study did not assume a foreign strategic stock draw, even though 400 million barrels of such stocks exist today. The foreign policy agencies which participated in the Bush Administration SPR study consider such high probability assumptions to be unrealistic, and to be inconsistent with both the structural changes that have taken place in the oil market and the bilateral and collective behavior of OPEC members. As the Department indicates in our response to the Chairman's letter of invitation, requesting a comparison of previous SPR size studies, assumptions regarding the likelihood of oil supply disruptions, foreign strategic stock draw, excess production capacity, and optimization of SPR fill and drawdown account for nearly all of the differences between our current study and prior studies.

In the current world environment, major disruptions run counter to the self-interest of both producers and consumers. Any substantial disruption of output from one or more of the larger producers, which would be necessary for a major disruption, would undermine the profitability of their large downstream investments in consumer nations, substantially reduce their income from oil production, which for many is the sole meaningful source of national revenue, and cause them to lose market share. Consumers would react to the higher oil prices engendered by a disruption by increased conservation, fuel switching, adoption of alternative energy technologies, and development of hydrocarbon resources outside of the geographic area involving the disruption. This is the pattern that emerged from previous oil

disruptions which, notably, took place when IEA strategic reserves were non-existent or very limited, and at a time when no major producer had invested in downstream operations in IEA member states.

In sum, the Administration believes that the SPR study submitted to Congress on February 2, 1990 represents the best current assessment of conditions and concerns related to SPR policy objectives. Both at current and projected levels the SPR reflects a strong U.S. commitment to minimize the effects of a range of worst case disruptions of the international oil market. Accordingly, the Administration strongly opposes section 3 of S. 2088 which requires enlargement of the SPR to one billion barrels at a budget cost of over $12 billion.

Section 4, Pre-drawdown Diversion of SPR Oil

Section 4 of Chairman Johnston's bill, S. 2088, provides authority to divert incoming SPR oil prior to a drawdown decision. The Administration supports the intent of this section. Under existing law, oil destined for the SPR cannot be sold until an SPR drawdown decision is made by the President. Oil under contract but not yet purchased could be diverted from the SPR if contract deliveries were terminated, thereby releasing oil into the world marketplace. However, terminating contracts would eliminate any control over the oil's destination by the United States Government. Authority for the pre-drawdown diversion of incoming cargoes destined for the SPR could help accelerate the release of oil to the domestic market, without the necessity for a Presidential drawdown decision. For this reason, the Administration proposes enactment of authority similar to that contained in section 4, as did the Reagan Administration before it. However, we have some disagreement with the wording of this authority in section 4, especially the required precondition that, "the world price of crude oil has, as a result, increased substantially," and the requirement for a finding by the President (rather than the Secretary). We believe that section 4 should be revised, as follows:

"Section 161 of the Energy Policy and Conservation Act (42 U.S.C. 6241) is amended by adding the following new subsection after subsection (g):

"(h)(1) If the Secretary finds that a severe energy supply interruption may be imminent, the Secretary may take actions he considers necessary to suspend the acquisition of petroleum products for and the injection of petroleum products into the Strategic Petroleum Reserve and may sell any petroleum products acquired for and in transit to, but not yet injected into, the Strategic Petroleum Reserve.

"(2) Sections 160(c) and (d) do not apply when a finding under this subsection is in effect. The period during which such a finding is in effect, and the quantity of petroleum products involved, shall be disregarded in applying those subsections for periods following the effective period of such a finding."

Sections 167 (b)(3) and 167(d) of the Energy Policy and Conservation Act (42 U.S.C. 6247(b)(3) and (d)) are amended by inserting in each section ", and from the sale of petroleum products under section 161(h)" after "section".

Alternative Financing

Public Law No. 101-46, the Strategic Petroleum Reserve Amendments Act of 1989, required the Department to conduct a study on alternative ways to finance the SPR. The study was undertaken in conjunction with the parallel study of the SPR size, through an interagency policy level steering group chaired by DOE. The interagency group carried out a number of activities in compliance with the requirements of Public Law No. 101-46, including the submission of an interim report to Congress on October 13, 1989, issuance of a notice of inquiry requesting comments on alternative financing methods, consultations with private firms interested in leasing, and preparation of preliminary draft solicitations for oil and facilities leasing.

Technical discussions were also held with representatives of Kuwait, Mexico, Norway, Saudi Arabia, and the United Arab Emirates, to explore the implications of a possible leasing arrangement with a major oil producer. Less detailed discussions were held with representatives of Nigeria, the United Kingdom and Venezuela. The final report was submitted to Congress on February 2, 1990, following review and approval by the President's Economic Policy Council.

In compliance with the statutory mandate, the alternative financing study addressed a broad array of alternatives including leasing oil, selling oil denominated bonds, using the Naval Petroleum Reserves to fill the SPR, imposing fees with new revenues earmarked for the SPR, mandating private sector storage, and leasing storage facilities for the SPR. In other forums, the Administration has strongly opposed certain financing options included in the study, particularly petroleum fees, charges, and taxes. Inclusion of these options in the study does not reflect any change in Administration policy; rather, they have been included in order to address the request by the Congress for consideration of a broad range of policy alternatives.

Each of the methods studied has advantages and disadvantages which are set forth in the study. But, with the exception of oil leasing, none of the options studied are more advantageous than, or are cost-competitive with, federal purchase of SPR oil.

Oil leasing from a producing country with excess production capacity appears to offer the possibility of reducing the costs of SPR oil acquisition below those of direct purchase at market prices. The analytical results of the study do not demonstrate that leasing, in general, will provide cost savings to the government. For example, study

results indicate that leasing of SPR oil through competitive commercial arrangements is unlikely to result in contract terms favorable to the government. This is due to the private sector's higher cost of capital. Nevertheless, the Administration is seeking discretionary authority to negotiate lease arrangements which would not preclude the Department from undertaking oil leasing with U.S. producers. However, based on consultations with potential suppliers, the opportunities for mutually advantageous contracts with private domestic suppliers appears to be very limited.

The opportunities to enter into an oil "leasing" (or a comparable) arrangement with oil producing nations which have excess production capacity seem more promising. Under this approach, the Federal Government might not immediately take title to the oil, but would acquire rights to make decisions about the oil, including the right to cause the oil to be sold into the U.S. economy at the direction of the President, during a severe energy supply interruption.

If this method of SPR financing were to cause more oil to be produced in the near term, then oil stockpiling would not have as great an effect on oil markets or consumers as oil produced under future, perhaps tighter, market conditions. The resulting cost to taxpayers relative to direct appropriations would also have to be less, on a present value basis, compared to direct purchase, in order for such leases to provide an advantage over outright Federal government purchase. From preliminary technical discussions, conducted jointly by the Departments of Energy and State, it appears that there may be a window of opportunity for arriving at contractual arrangements with one or more oil producers that would provide mutual advantage to the United States and to exporting countries with low costs of production.

For the United States, there would be the opportunity to obtain access to, and control over, additional and perhaps substantial, emergency oil supplies at less cost than direct purchase of equivalent volumes of oil by the U.S. Government. For a producing nation, there would be an opportunity to earn a current financial return by changing the storage location from its natural reservoirs to the SPR caverns.

It is not certain at this point whether such mutually advantageous arrangements could be achieved. We have neither made specific proposals to, nor received specific proposals from, oil producing countries. From our discussions to date, we can conclude that there are tax, policy, and contractual issues which would need to be addressed and resolved, before a leasing arrangement could be successfully concluded.

The President's budget proposal calls for a level of appropriated funds that would permit SPR fill of approximately 59,000 barrels of oil per day in fiscal year 1991 and 50,000 barrels per day in subsequent years through direct purchase of the oil. This would increase the rate of fill beyond the level provided by the Congress for fiscal year 1990. The President's budget proposal does not contemplate any of the alternative

financing methods included in the study. The President has, however, authorized the Department to seek discretionary authority to negotiate, in consultation with other federal agencies, "lease" agreements with one or more producing countries, for SPR oil up to the 750 million barrel target level, and within the requested FY 1991 budget authority. At this point, the Administration seeks only discretionary authority to negotiate a leasing arrangement. Should such an arrangement be feasible, and were it to be concluded in a relatively short period of time, it could be possible to achieve a higher than planned fill rate at current and projected funding levels.

Accordingly, the Department recommends that the Congress enact both the FY 1991 appropriation requested by the President for the SPR and legislation authorizing, but not requiring, "leasing." I will address the specifics of the Department's desired "leasing" legislation below, under our comments on section 5.

Section 5, Leasing Authority

The Department of Energy currently has lease authority which is constrained because, among other reasons, there is no provision for the Government to return the oil to the lessor absent a Presidential declaration of emergency and a drawdown of the SPR. As part of the Alternative Financing Study, "leasing" was analysed, discussions held with producing countries, and views sought through a notice of inquiry. In response to the requirements of P.L. No. 101-46, the Department prepared and included in the February 2, 1990 report draft legislative language which would give the Department of Energy basic authority to lease oil and/or facilities. That same draft language is contained in section 5 of S. 2088. The Department also included in the February 2 report on the Financing Study additional legislative provisions that could further affect the ability of the Department to negotiate a cost-effective lease, or serve other strategic storage goals, and that the Congress might address in legislation (Volume 1, Chapter VI, Section F).

In calling for today's hearing, the Committee asked the Department to state its position on the basic draft leasing authority and on these additional legislative provisions. Our views may be summarized as follows:

Basic Leasing Authority

The basic leasing provision would authorize, but not require, the storage of leased oil in SPR facilities or in other facilities, as part of a "Supplementary Oil Reserve" that would be fully within the control of the DOE, and could be drawn down and distributed just as if it were in the SPR. The Department supports the enactment of this authority, with one major modification. Because it is the Administration's position that the SPR should not be expanded beyond the 750 million barrel level, and storage facilities are now under development to permit completion of a 750

million barrel SPR, the basic leasing authority should be revised to apply only to storage of the leased oil in SPR facilities, rather than covering the acquisition of new storage facilities. DOE has provided the Committee with draft language reflecting the necessary changes. Our draft language also requests several other, less significant, changes from the draft basic leasing language contained in the February 2, report.

Specific Additional Authorities

The Department favors the enactment of six of the nine additional authorities set out in the February 2 report, as follows:

Tax Relief

Depending on the particulars of the transaction, an oil "leasing" deal could subject an oil producer country, which currently pays no U.S. taxes on its oil sales to the U.S., to various federal, state and local income, property and other taxes. The DOE clearly would have to absorb any such tax costs as part of the lease transaction.

The difficulty with proposing legislation to solve tax problems at this time is that the need for relief from specific tax provisions is highly dependent on the particulars of transactions with identified foreign countries. An oil deal for the SPR might necessitate extensive legislative relief from applicable taxes, or virtually none at all. For this reason, the draft legislation suggests, as a mechanism for solving potential tax problems, the adoption by Congress of a "fast-track" legislative technique such as is now used for trade agreements. Under this approach, the Congress would enact procedural rules assuring an up-or-down vote on tax legislation to implement an oil leasing contract, thereby deferring the issue until later but assuring timely legislative consideration after a bilateral agreement is arrived at.

Procurement Law Waiver

The February 2 report details the procurement processes and clauses that are potentially applicable to leasing activities. Although there are waivers of and exceptions to certain of these requirements for transactions with foreign governments, the requirements generally do not seem well suited to bilateral negotiations with foreign countries. Accordingly, the draft legislation contains a provision authorizing waiver of applicable procurement laws. Since an oil leasing effort would be directed at an oil producer country or its state oil company, such a provision both would be relevant to undertaking noncompetitive negotiations with individual countries, and could apply to particular contractual provisions.

Import Charges

Any import duties or other charges on leased oil would likely be borne by DOE. This provision of the draft legislation would excuse DOE from paying

import charges that otherwise would apply to oil which the Secretary certifies is for the Supplementary Oil Reserve.

Export Controls

Since the supplier of leased oil could seek to export it, in the event that it was returned to the lessor by the DOE at the end of a contract term, this provision of the draft legislation would allow the President to waive applicable export control laws in that connection.

Arbitration of Disputes

In an oil leasing deal with a foreign government, it could be necessary to have disputes resolved in some mutually agreeable neutral forum. This may not be possible without express statutory authorization; this provision of the draft legislation would permit the DOE to agree to binding arbitration of disputes concerning leased oil, if that should become necessary in order to close an attractive oil deal.

Defense Petroleum Inventory

The draft legislation would allow up to 10 million barrels of leased oil to be dedicated to the needs of the Defense Department. This is similar to proposals advanced by the Administration in the context of Naval Petroleum Reserves leasing, with the aim of assuring that emergency defense petroleum requirements can be met, in a manner that does not interfere with use of the SPR for the purpose of mitigating economic losses. The Administration proposes only one Defense Petroleum Inventory, which would be created if favorable legislative action were taken in the context of its proposal for the leasing of Naval Petroleum Reserve No. 1 at Elk Hills, California.

Other EPCA Amendments

In addition to the amendments contained in S. 2088, the Department supports several other amendments to existing law to expand authorities to draw down the SPR. They include provisions that would: allow a drawdown in response to a domestic oil supply disruption (but without lowering the existing "severe energy supply interruption" threshold for SPR drawdown), exempt SPR Distribution Plan amendments from certain procedural rulemaking requirements; and allow exports of SPR oil for the purpose of obtaining refined product.

Drawdown in Response to a Domestic Supply Interruption

Under current law, the SPR can be drawn down only when the President finds that drawdown "is required by a severe energy supply interruption" or by U.S. obligations under the Agreement on an International Energy Program. Section 3(8) of EPCA defines "severe energy supply interruption" as:

> a national energy supply shortage which the President determines--
>
> (A) is, or is likely to be, of significant scope and duration, and of an emergency nature;
> (B) may cause major adverse impact on national safety or the national economy; and
> (C) results, or is likely to result, from an interruption in the supply of imported petroleum products, or from sabotage or an act of God. (emphasis added)

With respect to the three conditions, under current law, from which a shortage could result, the Department believes that it is important to remove the term "imported" from existing law, to permit the SPR to be used in the event of a shortage of petroleum from any source. Events of the past year, including the tanker accident in Alaska, point to the potential for an interruption in oil supplies from domestic, as well as foreign sources. The proposed change in the legislation would provide the President with more flexibility in responding to such events. The Department believes that, with the exception of the removal of the term "imported", current law provides the Executive Branch with sufficiently broad discretion on whether, when, and how to draw down and distribute the Reserve.

Authority to Allow Exports of SPR Oil for Refining in the Caribbean or Elsewhere

It could prove desirable during an oil supply disruption to ship SPR oil to Caribbean refineries outside the U.S. and its territories, or to other foreign destinations, in order to exchange it for refined products or to refine it under a processing agreement. The Department urges enactment of a provision which would grant authority to actually conduct such transactions. As early as December 1982, in a report to the Congress on "Comprehensive Energy Emergency Response Procedures," required to be submitted by the Energy Emergency Preparedness Act of 1982, Public Law No. 97-229, President Reagan stated:

> Legislation with respect to export controls that affect SPR crude oil may be appropriate in order to maximize SPR distribution flexibility. It is possible that some buyers of SPR crude oil may wish to have it refined in non-U.S. Caribbean refineries. Although each of the SPR's storage caverns contains only oils meeting a common specification, these oils are not segregated in a manner which corresponds with the several statutes governing the export of crude oil. (p.34)

We are submitting a background paper on this subject which explains the need for legislation in greater detail, and suggests legislative language to effect an appropriate amendment to the EPCA.

U.S. Participation in the International Energy Program (IEP)

Extension of the authorities of Title II of EPCA is essential to meeting key United States obligations to the International Energy Agency (IEA) and to meaningful United States participation in the IEA.

The IEA, founded in 1974 at the instigation of the United States, is the principal forum for energy cooperation among twenty-one industrialized countries which are participants in the IEP Agreement. The IEP is designed to reduce the economic risks of oil supply disruptions and to reduce dependence on oil through coordinated and cooperative efforts. Given the increasingly intergrated nature of world energy markets, cooperation with other industrialized countries through the IEA will continue as an essential feature of the Administration's energy security policy.

The International Energy Program (IEP) Agreement called for the establishment by the IEA of an information system on the international oil market and other sources of energy. The IEA's information system and assessments have been invaluable in increasing the understanding of international energy markets and in clarifying important developments and energy policy issues.

In the event of emergencies, the IEA has on hand the Emergency Sharing System. In the event of activation of the System, the IEP Agreement commits IEA countries to reduce oil demand and to share available oil supplies according to an established formula. Participation in the system requires member countries to maintain:

- emergency oil stocks (comprising strategic stocks and privately held inventories) equivalent to 90 days of net oil imports in the prior calendar year;
- the ability to reduce consumption of oil by 10 percent, or, as an alternative, readiness to draw down oil stocks in excess of the 90-day commitment; and
- legal authorities to participate in the system by both the United States Government and United States private companies.

The U.S. Government stands firmly behind all of our commitments to the IEP. The Administration has urged, however, that alternative measures, particularly coordinated use of strategic government-owned or government-controlled oil stocks, should be utilized first, for as long as practicable, in a major oil disruption.

IEA oil stock coordination policies help increase the economic benefits of using stocks, while ensuring that the burden of building and maintaining those stocks is shared more equitably. Thus, efforts by other IEA

countries to build up their oil stocks and to be able and prepared to draw on them when necessary are an indispensable complement to the United States Strategic Petroleum Reserve program. In this regard, we are continuing to stress the need for importing countries to build strategic stocks proportional to those held by the U.S..

Section 252 of the EPCA is the most important of the Title II authorities. The IEA emergency system is designed to rely heavily on the voluntary assistance of private companies. Section 252 makes U.S. oil company participation possible by:

- providing limited antitrust and breach of contract defenses permitting companies to participate in voluntary supply actions and to provide information that may be confidential or proprietary; and

- during non-emergency periods, allowing participation at IEA meetings on the IEP allocation and information provisions and in tests of the IEA emergency data and sharing systems.

Legal defenses are contingent upon the oil companies' compliance with section 252 procedural safeguards embodied in the "Voluntary Agreement and Plan of Action to Implement the International Energy Program", originally agreed to in 1976 by a number of U.S. oil companies and approved by the U.S. Government. In 1987, the Attorney General and the Secretary of Energy approved a "Second Plan of Action" describing in detail, industry actions to implement international emergency oil sharing and specifying record keeping, reporting and antitrust monitoring requirements.

Seventeen U.S. oil companies, including major international and independent oil companies, are participants in the Voluntary Agreement and in the Second Plan of Action. The Department of Energy, the Department of Justice, and the Federal Trade Commission closely monitor industry participation in the IEP, and reports to Congress have consistently concluded that industry activity under the Voluntary Agreement has had no anti-competitive effects.

EPCA Title II contains two other significant provisions required to fulfill U.S. obligations under the IEP. Section 251 provides authority for mandatory international oil allocation, that the IEA requires each member country have available as a last resort in the event that voluntary emergency sharing fails to achieve its goals. Section 254 provides authority for the Executive Branch to provide to the IEA, as necessary, information and data related to the oil industry.

These authorities originally were made effective until June 30, 1979, and subsequently have been extended twelve times by Congress.

EPCA Title II authorities expire on June 30 of this year. The Administration supports the extension of the Title II authorities, and would prefer that such authorities be extended for a minimum of five years, to expire at the same time as the Title I authorities. This would

allow the U.S. Government to synchronize both of the major energy emergency programs, particularly with respect to the planning required for a coordinated drawdown of IEA countries' strategic stocks as the first line of defense in a major oil supply interruption. Such an extension would reaffirm to our IEA allies, as well as to OPEC, our strong commitment to the IEA and to IEA programs to respond to oil disruptions.

This concludes my written statement. I will be happy to answer any questions you may have at this time.

**Background Paper on Allowing Exports of Strategic Petroleum Reserve (SPR) Oil for Refining in the Caribbean or Elsewhere**

The Department of Energy believes that legislation with respect to export controls that affect SPR crude oil is necessary to maximize SPR distribution flexibility. Providing authority to permit the export of SPR oil, irrespective of its origin, would facilitate oil exchanges or processing agreements to supply the U.S. with needed petroleum products. In addition, a disruption could affect Caribbean refineries which supply refined products to the East Coast, raising a question of whether shipments to Caribbean refineries outside of the U.S. and its territories, or to other foreign destinations, should be permitted, or facilitated, in SPR sales.

The export of imported oil stored in the SPR, and not commingled with domestic oils, is governed by the Department of Commerce "Short Supply Controls," 15 C.F.R. Part 777. These regulations in effect would permit the export of imported oil under certain circumstances, of which the most relevant to SPR exports to the Caribbean is that in which: the export is part of a transaction resulting in the importation of refined products of a quantity and quality not less than would be derived from domestic refining; the products are to be sold at prices no higher than the lowest prices at which they could have been sold by the nearest capable U.S. refinery; and for compelling economic or technological reasons beyond the exporter's control, the crude oil cannot reasonably be processed in the U.S. (section 777.6(d) (1) (vii)). However, there are somewhat more stringent, independent statutory tests to be met as preconditions to the export of other crude oils, including Alaska North Slope (ANS) 1/ and Naval Petroleum Reserves (NPR) oil. See section 7(d) of the Export Administration Act of 1979, 50 U.S.C. App. 2406(d) and 10 U.S.C. 7430(e); see also 30 U.S.C. 185(u) (oil shipped across a Mineral Leasing Act section 28 right-of-way) and 43 U.S.C. 1354(a) (Outer Continental Shelf).

A complicating factor with respect to the SPR is that oils subject to the disparate legal export criteria are to some extent commingled in storage, and could become even more commingled during drawdown. Thus, it will be difficult for a buyer to know, or for DOE to tell the buyer, which export control laws the oil he is buying is subject to. Some modification of the

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1/ In June 1986 the Secretary of Commerce made the necessary national interest determination under section 103 of the Energy Policy and Conservation Act (EPCA), 42 U.S.C. 6212, to authorize the export from Alaska of Cook Inlet Oil, which, unlike ANS crude, is subject only to the Short Supply Controls. Subsequently the Commerce Department amended its regulations to implement the export authorization. 50 F.R. 26145 (June 25, 1985) and 51 F.R. 20252 (June 4, 1986). At this time there is no Cook Inlet oil stored in the SPR.

Commerce Department's regulations may be necessary simply to assure that imported oil in the SPR is not subject to more stringent limitations than ordinarily would be the case. In the view of the Department of Energy, these modifications could involve a mechanism or formula for deeming certain portions of the commingled oils to be imported oil, subject only to Commerce's short supply controls.

To the extent that prospective bidders would have difficulty satisfying some or all of the regulatory criteria, or would need to know before bidding whether the Department of Commerce will grant an export license, amendments to the Commerce regulations would be necessary. With respect to imported oil stored in the SPR, it is the Energy Department's view that the Commerce regulations could be amended to delete the present requirement that the export be part of a transaction resulting in the importation of refined products of the same quantity and quality that would result from domestic refining, and/or the requirement that the exporter demonstrate that for compelling economic or technological reasons beyond his control, the crude oil cannot reasonably be processed in the U.S. However, this opportunity for relief applies only to imported oil, not to oils that are subject to more stringent, independent statutory export restrictions.

General waiver of the export controls on ANS oil in the SPR clearly would require legislation, and waiver of the controls on NPR oil, and oil which has been shipped across a section 28(u) right-of-way, would at least necessitate a Presidential finding, and might require legislation. There are precedents for a legislative waiver. Under section 7(d)(3) of the Export Administration Act, all legal restrictions on crude oil and petroleum product exports are waived if such exports are pursuant to the emergency sharing system of the International Energy Program, or to fulfill U.S. obligations under the U.S.-Israeli supply agreement. There is another such waiver for the export of OCS oil under section 28(d) of the Outer Continental Shelf Act, "pursuant to an existing international agreement." A similar waiver would be needed to facilitate the refining of SPR oil in the Caribbean or elsewhere.

In June 1985, the President determined that the export of crude oil (other than ANS and NPR oils) to Canada for use or consumption in Canada is in the national interest and made the necessary findings under section 103 of the EPCA, section 28 of the Mineral Leasing Act, and section 28 of the Outer Continental Shelf Lands Act to permit such exports. The President's decision to permit the export of crude oil to Canada followed a March 18, 1985, Trade Declaration between the President and Canadian Prime Minister Mulroney providing for the reciprocal relaxation of U.S. and Canadian oil

export restrictions. 2/ An exporter will continue to need to obtain a validated license from Commerce for crude exports to Canada, but it ordinarily would be routinely issued for qualifying crude oil. Although there has been no indication of a likelihood that SPR oil will be delivered to Canada in an emergency, this hypothetically is possible, and it is possible physically to deliver SPR oil to Canada either by pipeline or by naval vessel.

As indicated above, the Department of Energy believes that administrative actions undertaken with the cooperation of the Commerce Department might afford partial relief from this problem, but even assuming this view to be correct, the situation is so complex that legislation clearly seems the better solution.

Legislative Language

Section 161 of the Energy Policy and Conservation Act (42 U.S.C. 6241) is amended by adding the following new subsection:

> "( ) Notwithstanding any other law, the President may permit any petroleum products withdrawn from the Strategic Petroleum Reserve in accordance with this section to be sold and delivered for refining or exchange outside of the United States, in connection with an arrangement for the delivery of refined petroleum products to the United States.".

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2/ Subsequently, the U.S. agreed in the U.S.-Canada Free-Trade Agreement, which went into force January 1, 1989, to allow the export to Canada of up to 50,000 barrels per day of ANS crude oil, subject to a requirement of ocean carriage on U.S.-flag vessels. The U.S. implementing legislation for the Agreement, Public Law No. 100-449 (Sept. 28, 1988), authorizes these exports in section 305(a), amending the Export Administration Act, and the Commerce Department has published implementing regulations. 55 Fed. Reg. 10051 (March 19, 1990). This is relevant to the SPR only in the sense that the 50,000 barrel ceiling on exports of ANS oil to Canada poses an additional administrative complexity with regard to SPR oil sales since the SPR contains some ANS oil which is or will be commingled with other oils, and a buyer of SPR oil who wishes to export it to Canada may need to be told by DOE how much ANS oil he will receive.

Attached are answers to the set of pre-hearing questions forwarded to the Department of Energy with our letter of invitation to Secretary of Energy, James D. Watkins, on February 21, 1990.

PRE-HEARING QUESTIONS FOR THE DEPARTMENT OF ENERGY
REGARDING S. 2088

Please provide answers to the following questions by March 15, 1990. If time and resource constraints prevent the completion of all answers by that date, complete them in the order given and provide the answers as they become available.

1. The SPR financing study provided draft legislative language that would be necessary in order to authorize leasing, but explicitly stated that the Department was not recommending this legislation. In the conclusion of his letter of February 2, 1990 accompanying the SPR financing study, the Secretary recommended that "the Congress enact... legislation authorizing, but not requiring, oil leasing for the SPR." Is the Department now in a position to recommend specific legislative language?

   a. Does the Department recommend the language that would generally authorize DOE to conduct oil and facilities leasing as described on pp. VI-103 to VI-105 and in Exhibit A of the study?

   b. Does the Department recommend any or all of the legislative changes that would enhance the effectiveness of leasing as described on pp. VI-105 to VI-111 of the study? If so, described in detail how these changes would be integrated with EPCA or other public laws.

   c. Are there other legislative recommendations concerning oil and facilities leasing that the Department can make at this time?

2. Provide a concise review and comparison of the methodology, assumptions, and conclusions of all the benefit-cost studies of SPR size that DOE and its contractors have performed since 1985 (including the one released in February 1990). Highlight the key differences in methodology and assumptions that have led to different conclusions (e.g., probability of disruption, size of disruption, length of disruption, price during disruption, stock drawdowns by other countries, macroeconomic effects, discount rate, etc.).

3. The SPR size study assumed that DOE would continue to acquire oil through direct purchase. Presumably, if the price of oil acquisition were low enough, an expansion from 750 million to one billion barrels would be cost-effective (holding all other size study assumptions constant). Provide an estimate of the cost of oil acquisition that would make a one billion barrel SPR cost-effective. Assume the cost of oil acquisition would take the form of an annual lease fee.

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c. Are there other legislative recommendations concerning oil and facilities leasing that the Department can make at this time?

Answer

The draft legislation in Chapter VI, Volume I of DOE's February 2 report was in two parts, which are discussed separately below. The first part presented a cohesive set of basic authorities to conduct oil and facilities leasing, as set out in Exhibit A to Chapter VI, and the second part, at pages 105 through 111 of Chapter VI, described a series of additional legislative changes that could enhance prospects for the success of a leasing effort or otherwise contribute to strategic oil storage goals. After discussing these draft legislative changes below, we respond to the Committee's request for advice as to how these changes might be drafted, by providing a rewrite of Exhibit A, which has been revised to reflect, together with these comments, the Department's position on all of the legislative issues raised in Chapter VI.

1. Basic Leasing Authority

The basic draft legislation in Exhibit A would authorize (but not require) the storage of oil owned by foreign governments or by private firms in a "Supplementary Oil Reserve," under "leases" or another contractual basis. The oil could be stored in SPR facilities or in other facilities. In any case, the oil would be fully within the control of the DOE, and could be drawn down and distributed just as if it were in the SPR. The Department favors the enactment of this set of legislative authorities (and of a related provision concerning the non-common carrier status of SPR pipelines), as incorporated into S. 2088, but with one significant modification and several relatively minor changes.

The significant modification concerns facilities leasing. The reason that the draft legislation at Exhibit A of Chapter VI covers authority for facilities leasing (in addition to oil leasing) is that the Congress directed the DOE to assume, for purposes of the SPR Alternative Financing Study, a decision to expand the SPR to one billion barrels. However, the Administration has made clear its opposition to expanding the SPR beyond 750 million barrels. Since the DOE already has under development the storage facilities to accommodate a 750 million barrel SPR, it does not need new facilities leasing authority for an SPR of that size. Consequently, the basic leasing authority should be revised in various respects to reflect the SPR's 750 million barrel goal. The enclosed rewrite of Exhibit A, thus, is designed to conform it with the Administration's SPR size policy.

2. Specific Authorities Supported

The Department supports the enactment of the following six of the nine specific authorities described at pages 105 through 111 of Chapter VI, and the enclosed revision of Exhibit A incorporates these authorities.

a. Tax Relief

Depending on the particulars of the transaction, an oil "leasing" deal could subject an oil producer country, which currently pays no U.S. taxes on its oil sales to the U.S., to various federal, state and local income, property and other taxes. The highly complex tax situation is explained in detail at pages 52-67 of Chapter III, Volume I, of the February 2 report. The DOE clearly would have to absorb any such tax costs as part of the lease transaction.

The difficulty with proposing legislation to solve tax problems at this time is that the need for relief from specific tax provisions is highly dependent on the particulars of transactions with identified foreign countries. An oil deal for the SPR might necessitate extensive legislative relief from applicable taxes, or virtually none at all. For this reason, the draft legislation suggests, as a mechanism for solving potential tax problems, the adoption by Congress of a "fast-track" legislative technique such as is now used for trade agreements. Under this approach, the Congress would enact procedural rules assuring an up-or-down vote on tax legislation to implement an oil leasing contract, thereby deferring the issue until later but assuring timely legislative consideration after a bilateral agreement is arrived at.

b. Procurement Law Waiver

Volume I, Chapter III of the February 2 report, at pages 14-45, details the procurement processes and clauses that are potentially applicable to leasing activities. Although there are waivers of and exceptions to certain of these requirements for transactions with foreign governments, the requirements generally do not seem well suited to bilateral negotiations with foreign countries. Accordingly, the draft legislation contains a provision authorizing waiver of applicable procurement laws governing the acquisition or provision of services or property, and

construction. Since an oil leasing effort would be directed at an oil producer country or its state oil company, such a provision both would be relevant to undertaking noncompetitive negotiations with individual countries, and could apply to particular contractual provisions. However, we have revised this provision to omit reference to facilities construction, in light of the Administration's opposition to an SPR in excess of 750 million barrels.

c. Import Charges

Any import duties or other charges on leased oil would likely be borne by DOE. This provision of the draft legislation would excuse DOE from paying import charges that otherwise would apply to oil which the Secretary certifies is for the Supplementary Oil Reserve. (For a discussion of these charges, please see Volume I, Chapter III, pages 50-52 of the February 2 report.)

d. Export Controls

Since the supplier of leased oil could seek to export it, in the event that it was returned to the lessor by the DOE at the end of a contract term, this provision of the draft legislation would allow the President to waive applicable export control laws to facilitate return of the oil in accordance with the lease contract. (See Volume I, Chapter III, pages 72-73 for a discussion of the applicable export control laws.)

e. Arbitration of Disputes

In an oil leasing deal with a foreign government, it could be necessary to have disputes resolved in some mutually agreeable neutral forum. As explained at pages 41-42 of Chapter III, Volume I, of the February 2 report, this may not be possible without express statutory authorization. This provision of the draft legislation, therefore, would permit the DOE to agree to binding arbitration of disputes concerning leased oil, if that should become necessary in order to close an attractive oil deal.

f. Defense Petroleum Inventory

The draft legislation would allow up to 10 million barrels of leased oil to be dedicated to the needs of the Defense Department. This is similar to proposals advanced by the Administration in the context of Naval Petroleum Reserves leasing, with the aim of assuring that emergency defense petroleum requirements can be met, in a manner that does not interfere with use of the SPR for the purpose of mitigating economic losses. The Administration proposes only one Defense Petroleum Inventory, which would be created if favorable legislative action were taken in the context of its proposal for the leasing of Naval Petroleum Reserve No. 1 at Elk Hills, California.

3. Specific Authorities Not Supported

The Department does not endorse the following three specific legislative changes described in Chapter VI of the February 2 report:

a. Authority to Sell Oil

This provision would allow the DOE, when leasing oil, to minimize its near-term requirements for budget authority, in addition to reducing requirements for budget outlays, despite the existence of a contingent DOE obligation to pay for the oil, e.g., at the time of an SPR drawdown. The provision would accomplish this by authorizing the Secretary to incur oil lease obligations in excess of available appropriations, and, if it should become necessary to pay for the oil at a price in excess of the actual sale price of the lessor's oil, to sell other Supplementary Oil Reserve or SPR oil to generate sufficient funds.

This authority to contract in advance of appropriations, known as "contract authority," is a form of "backdoor financing" which circumvents the normal appropriations process and, therefore, is opposed by the Administration. (For a further discussion, please see Volume I of the February 2 report, Chapter III, pages 29-30, and Chapter VI, pages 103-107.)

b. Environmental Impact Statements (EISs)

The DOE's report notes that the EPCA already contains a limited EIS waiver for certain SPR storage facilities, and suggests this language as a model in case the Congress sees fit to enact waiver authority for oil or facilities leasing.

c. Cargo Preference

The discussion of this issue in the report explains the current legal significance of cargo preference requirements, so that the Congress can, if it so wishes, give directions either to liberalize or to strengthen these requirements.

Attachment

## Part C: Supplementary Oil Reserve

### Declaration of Policy

Sec. 171(a). The Congress finds that establishment of a Supplementary Oil Reserve can help diminish the vulnerability of the United States to the effects of a severe energy supply interruption, and contribute to the effectiveness of the International Energy Program.

(b)(1) It is hereby declared to be the policy of the United States, to the extent that it is determined to be cost-beneficial and consistent with the Strategic Petroleum Reserve program, to encourage supplementation of the Strategic Petroleum Reserve and other domestic petroleum product stocks by contracting for Supplementary Oil Reserve storage in government-owned facilities.

(2) The purpose of this Part is to add to the Secretary's existing authority under Part B to contract for petroleum products for the Strategic Petroleum Reserve by authorizing the Secretary when it is determined to be cost-beneficial to contract for Supplementary Oil Reserve storage, in otherwise unused Strategic Petroleum Reserve storage facilities, of petroleum products owned by any person or government.

(3) It is the policy of the United States that the authorities provided by this Part shall be used as a complement to the Strategic Petroleum Reserve and not in any manner which reduces the cost-effectiveness of, or diminishes the control of the President and the Secretary over, the drawdown or distribution of the Strategic Petroleum Reserve.

### Definitions

Sec. 172. Terms used in this Part have the same meaning that they have in Part B.

### Use of Strategic Petroleum Reserve Facilities

Sec. 173(a). The Secretary may contract for Supplementary Oil Reserve storage, in otherwise unused Strategic Petroleum Reserve storage facilities, of petroleum products not owned by the United States, to the extent determined to be cost-beneficial and consistent with the purposes of Part B and of this Part. A contract entered into under this section shall not limit the discretion of the President or the Secretary to conduct a drawdown and distribution of the Strategic Petroleum Reserve.

(b) Petroleum products stored under any such contract are subject to the authority of the Secretary, under section 161 (except sections 161(e) and (g)), to draw down and distribute petroleum products, as if such crude oil and petroleum products were in the Strategic Petroleum Reserve.

(c) The Secretary may store petroleum products under this section with or without charge, or pay a fee for their storage.

Strategic Petroleum Reserve Tie-In

Sec. 174(a). If the Secretary determines that one or more contracts or proposed contracts for Supplementary Oil Reserve storage of petroleum products under section 173 would for their duration be cost-beneficial relative to equivalent storage of petroleum products in the Strategic Petroleum Reserve, the Secretary may so notify each House of the Congress, including in his notification the same information required under section 154(e) with regard to petroleum products proposed to be stored in the Strategic Petroleum Reserve. From sixty calendar days after notification, all petroleum products actually stored under such a contract shall be counted as part of the Strategic Petroleum Reserve for purposes of Part B.

(b) Petroleum products counted as part of the Strategic Petroleum Reserve under this section, if otherwise eligible, qualify to satisfy any applicable provisions for Regional Petroleum Reserves or noncontiguous storage under Part B.

(c) Notwithstanding any other law, the expiration of a contract for the storage of petroleum products under section 173 is not a violation of any requirement concerning the size or rate of fill of the Strategic Petroleum Reserve. For purposes of section 160(d), the reduction in the quantity of crude oil in storage in the Strategic Petroleum Reserve attributable to expiration of such a contract is considered to occur between the end of the fiscal year in which expiration actually occurs and the beginning of the following fiscal year.

Waiver of Fill Requirements

Sec. 175. Sections 160(c) and (d) do not apply for a given fiscal year if, during that fiscal year, the President transmits to the Congress a written certification that a good faith effort has been or is being made, using the authorities in this Part, to achieve Supplementary Oil Reserve storage which, together with fill of the Strategic Petroleum Reserve, utilizes or would utilize substantially all appropriations available for these purposes.

Implementation

Sec. 176(a). Notwithstanding subsection 160(c), the Secretary may use, for the acquisition of petroleum products under this Part, without further appropriation, funds available for the planning, administration, acquisition, and construction of storage and related facilities of the Strategic Petroleum Reserve, and funds available for the acquisition, transportation, and injection of petroleum products into the Strategic Petroleum Reserve. For the purposes of this section, the acquisition of petroleum products includes payments of amounts due upon the expiration, termination or other conclusion of the acquisition contract.

(b) The Secretary, as consideration for the storage of petroleum products in the Supplementary Oil Reserve, may allow the additional storage, in Strategic Petroleum Reserve facilities, of petroleum products for commercial purposes.

(c) The Secretary, in any contract entered into under this Part, may provide for the acquisition by purchase or exchange of stored petroleum products by the United States, for storage in, or use in connection with, a drawdown and distribution of petroleum products from the Strategic Petroleum Reserve.

(d) An amendment of the Strategic Petroleum Reserve Plan is not required for any action taken under this Part.

(e) Petroleum products stored in the Supplementary Oil Reserve have the same status as petroleum products and facilities owned by the United States for all purposes associated with the exercise of the laws of any state or political subdivision thereof.

(f) Contracts under this Part may be of such duration as the Secretary considers necessary or appropriate.

(g) For purposes of any law or regulation affecting the solicitation, negotiation, execution or performance of contracts, contractual action pursuant to this Part need not comply with applicable laws and regulations (other than those directly relating to safety, health or the environment) governing the acquisition or provision of services or property.

(h) Notwithstanding any other law, the importation of petroleum products which the Secretary of Energy certifies are for storage in the Supplementary Oil Reserve shall not be subject to any duty, tax or fee.

(i) Notwithstanding any other law, the President may permit export of crude oil pursuant to a contract with a foreign government or agency thereof for storage of that crude oil in the Supplementary Oil Reserve.

(j) The Secretary may agree to binding arbitration of disputes under a contract with a foreign government or agency thereof for Supplementary Oil Reserve storage.

(k) Section 3(c) of the Trade Agreements Act of 1979 (19 U.S.C. 2504(c)) shall apply to a bill affecting Federal or state taxation, or both, submitted by the President in implementation of an international agreement negotiated in fulfillment of this Part, as if the international agreement were an agreement approved under section 2(a) of that Act when the President determines that it is necessary or appropriate to amend, repeal or enact a statute of the United States to implement a requirement of, or amendment to, the international agreement.

Defense Petroleum Inventory

Sec. 177. (a) The Secretary may establish and maintain storage and related facilities of the Supplementary Oil Reserve to meet petroleum

product requirements of the Department of Defense, as a Defense Petroleum Inventory of petroleum products. Notwithstanding section 174(a), the Defense Petroleum Inventory shall not be counted as part of the Strategic Petroleum Reserve.

(b) Upon the request of the Secretary of Defense, petroleum products in the Defense Petroleum Inventory shall be drawn down and distributed by the Secretary to, or on behalf of, the Department of Defense for use, sale, or exchange. Petroleum products in the Defense Petroleum Inventory may be drawn down and distributed, used, sold, or exchanged, without regard to --

(1) whether the petroleum products have been commingled with petroleum of the Supplementary Oil Reserve;

(2) the requirements of this title concerning drawdown of the Strategic Petroleum Reserve; or

(3) otherwise applicable Federal contracting statutes and regulations.

The Secretary shall exercise the authority provided by this subsection in a manner which does not adversely affect drawdown of the Strategic Petroleum Reserve.

(c) Upon the request of the Secretary of Defense, and subject to the availability of funds from the Department of Defense, the Secretary shall acquire and store in the Defense Petroleum Inventory petroleum products to replace petroleum products drawn down under subsection (b).

(d) The Department of Defense shall reimburse the Department of Energy for --

(1) drawdown and distribution services provided under this section, in amounts that the Secretary of Energy determines to be reasonable; and

(2) all costs of acquiring and storing in the Defense Petroleum Inventory any petroleum products in excess of 10 million barrels.

(e) Any funds available to the Secretary for the development of storage and related facilities of the Supplementary Oil Reserve may be used to construct storage and related facilities for the Defense Petroleum Inventory.

Question 2. Provide a concise review and comparison of the methodology, assumptions, and conclusions of all the benefit-cost studies of SPR size that DOE and its contractors have performed since 1985 (including the one released in February 1990). Highlight the key differences in methodology and assumptions that have led to different conclusions (e.g., probability of disruption, size of disruption, length of disruption, price during disruption, stock drawdowns by other countries, macroeconomic effects, discount rate, etc.).

Answer

Since 1985, the following DOE/interagency or DOE-supported studies that relate to the economics of SPR size have been undertaken:

Strategic Petroleum Reserve: Analysis of SPR Size Option, Interagency Working Group on SPR Size, February 1990.

Preliminary Results of the SPR Size Cost-Benefit Study, Paul Leiby and Russell Lee, Oak Ridge National Laboratory, 1988.

The Teisberg and Hogan-Leiby Strategic Petroleum Reserve Planning Models: Numerical Comparisons, Oak Ridge National Laboratory, April 30, 1988.

Macroeconomic Impacts of Energy Shocks, Energy Modeling Forum (EMF), Stanford University, December 1987.

Calculating the Risk-Reduction Benefits of Strategic Petroleum Reserve Policies, William W. Hogan and Paul N. Leiby, November 1986.

SPR Working Group Draft Report, Interagency Working Group on SPR Size, June 1986.

Oil Market Risk Analysis, William W. Hogan and Paul N. Leiby, December 1985.

Only the 1986 and 1990 interagency studies were completed as administration studies in support of the policy process. The 1987 Energy Modeling Forum study was not a cost-benefit study. The remaining studies were done under contract to the SPR Office and were not developed or reviewed by Federal agencies. Of these, the two Hogan-Leiby studies can be considered as one, while the Oak Ridge comparison study of the Teisberg and Hogan-Leiby models is not an independent cost-benefit study but rather a methodological comparison.

Time has not permitted a detailed comparison of the Hogan-Leiby study, since several more weeks are needed to complete such an assessment. The

following compares the assumptions of the 1986 and 1990 interagency studies and the 1988 ORNL study.

A. BACKGROUND

Since 1985, two interagency size studies have been completed; one in 1986, and the other in 1990. Also, DOE's SPR Office had a contractor study done in 1988.

- o In February, 1986, with oil in the SPR nearing 500 million barrels, the Comptroller General ruled that deferred funds for construction of SPR oil facilities at Big Hill had to be spent. These events and the sharp decline in oil prices triggered another study of SPR size and fill issues.

- o In November 1988, Oak Ridge National Laboratory (ORNL) technical staff, under contract with the SPR office, provided to the Department of Energy (DOE) a report titled Preliminary Results of the SPR Size Cost-Benefit Study. The Oak Ridge study was not subjected to Administration review by agencies with experience and knowledge of SPR issues either during the study's development or after completion.

- o A DOE report on SPR expansion, provided to Congress in April 1989, did not contain Oak Ridge-developed material because of DOE and other agency concerns about its assumptions and methodology. The DOE report to Congress indicated that a further study of the merits of expanding the SPR beyond 750 million barrels would be undertaken on an interagency basis, using Federal personnel and expertise. This study became the SPR: Analysis of Size Options, which was transmitted to Congress on February 2, 1990. This study contains the methods and assumptions that the Administration believes are sound and objective and that are based on the best available information.

B. STUDY SIMILARITIES

- o The studies focused on economic costs and benefits to the United States of alternative SPR size policies.

- o All studies weighted SPR benefits by probabilities of an oil supply disruption.

- o All studies used "present value" methods, discounting future cost and benefits as called for by OMB Circular A-94.

- o Basic facilities, cost, and schedule data were compatible.

C. STRATEGIC CONSIDERATIONS

The SPR has national security and international dimensions. Cost-benefit analysis is one of several important considerations.

- o 1986 Interagency Study. The 1986 study was strictly a cost-benefit effort; no strategic, foreign policy, or other considerations were evaluated.

- o 1988 ORNL Study. The 1988 ORNL study was strictly a cost-benefit study with only short, general discussions of deterrence and risk reduction, and no assessment of strategic or foreign policy considerations. Foreign policy and intelligence agencies were not consulted for the ORNL study.

- o 1990 Interagency Study. In the 1990 interagency study, cost-benefit analysis was only one of the factors considered in determining the proper size of the SPR. The 1990 interagency study also assessed national security/force deployment objectives, foreign policy/geopolitical objective, the role of the SPR in providing additional time to address a crisis, deterrence to politically inspired supply disruptions, and American international leadership on energy issues.

Only the 1990 interagency study incorporated the full panoply of strategic, foreign policy, and energy leadership considerations.

D. STUDY COST-BENEFIT RESULTS

The results of the cost-benefit estimates for each study are summarized and compared below.

- o 1986 Interagency Study. The 1986 study did not consider a SPR size larger than 750 million barrels because of large and growing foreign stock holdings and because of large amounts of excess world oil production capacity. Net benefits of expanding the SPR from 500 to 750 million barrels ranged from a negative $0.25-0.36 billion (1988 $) for low probabilities of disruption to $0.3-3.3 billion with high probabilities of disruption.

- o 1988 ORNL Study. The 1988 ORNL study made hundreds of model runs. Fifty were selected to represent the general pattern of results in terms of the relative frequency of net economic benefits derived by increasing SPR capacity from 750 million barrels to 1 billion barrels. In the primary set of runs, the most frequent outcome (about 30 percent) involved $2-4 billion in net benefits from expansion; the next most frequent outcome (24 percent) produced highly positive benefits (in excess of $8 billion with the non-conventional war scenario); 16 percent of

the runs produced negative net benefits from $0.0 to $-0.5 billion.

- o 1990 Interagency Study. The 1990 interagency study set up a mid-case run which showed negative net benefits of $2.6 billion for the 750-1000 million barrel increment (cost-benefit ratio of 4.5 to 1). Varying all the assumptions to the limit of their plausible range, one at a time, produced results that were all strongly negative. Only when nearly all the assumptions were set to maximize SPR net benefits did expansion to 1 billion barrels show positive net benefits.

The net benefits differed for the studies primarily because of key assumptions about: probability of disruptions; excess capacity; foreign strategic stocks; and, under high probability of disruption conditions, model optimization of SPR fill and draw.

A comparison of these and other important assumptions follows.

## E. KEY ASSUMPTIONS COMPARISON

Size of disruption, disruption probabilities, excess world oil production capacity, foreign strategic stockdraw and whether the SPR fill can be accomplished optimally (least cost fill and maximum benefit draw) are the five critical assumptions in evaluating alternative SPR sizes. Other assumptions such as length of disruption, oil demand elasticity, oil price path, fill rates, etc., while important, are not as critical as the first five.

### Size of Disruption

In general, the larger the projected disruption size, the more likely addition to the SPR will provide incremental benefits.

- o 1986 Interagency Study. The largest gross disruption considered by the 1986 study was on the order of 13 million barrels per day. The scenario driving the worst case disruption size was closure of the Strait of Hormuz.

- o 1988 ORNL Study. The largest net disruption size in the 1988 ORNL study was 15 million barrels per day, which was one of three scenarios; the maximum disruption size in the other scenarios was 10 million barrels per day. The scenario driving the 15 million barrel per day worst case disruption size was use of unconventional weapons in a major local war in the Middle East.

- o 1990 Interagency Study. The 1990 interagency study considered disruption sizes in half-million barrel increments as large as 26.5 million barrels per day. The scenario driving the

worst-case disruption size was the shutdown of two of the largest Persian Gulf oil producers.

All three studies concentrated on worst-case disruptions well beyond the interruptions of the 1970's, the most severe of which was the 1978/79 Iranian Revolution: 3.7 million barrels per day for 6 months. The 1986 and 1990 interagency studies derived their "major" (1986) or "worst-case" (1990) disruptions from specific scenarios. The 1988 ORNL study disruption sizes were derived from generalized estimates of non-deliberate OPEC disruptions with the largest loss of OPEC capacity resulting from use of unconventional weapons.

Probability of Disruptions

The assumed probability of disruption is quite important to the cost-benefit outcome because the higher the disruption probabilities, the higher the benefits, because all benefits are probability weighted.

The probability differences between the studies are not easily comparable because of differences in model structures and related assumptions. They are, however, quite large; the 1986 interagency study and the 1988 ORNL study probabilities envision a much greater likelihood of a worst case supply disruption than does the 1990 interagency study.

The 1990 interagency study, based on a CIA assessment, assumes that the probability of a worst case disruption is substantially lower than the probability used in the 1988 ORNL study. CIA analysts approached their contribution by first formulating a set of scenarios that bracketed their best sense of reasonable "worst cases" of oil supply disruptions that might occur through the 1990's. Then, to provide general probabilities of these cases occurring, the CIA combined an examination of past oil supply disruptions with current qualitative analysis of important oil market and regional trends. At the request of the interagency group, the CIA refined its probabilities by surveying several Agency oil market and Middle East experts on the likelihood of its least severe case occurring during the period 1995-2010. The responses ranged between a cumulative 3 and 10 percent over the 15-year period. The conclusion provided to DOE was that the likelihood of the Agency's least severe case occurring once between 1995 and 2010 is 10 percent, plus or minus 5 percentage points. Study group statisticians then fit a Weibull probability distribution curve to both the historical data on disruptions provided by the CIA and the CIA projected probabilities of future disruptions. The resulting "set" of probabilities is consistent with the historical occurrences of oil supply disruptions and the CIA assessment of disruptions through the 1990s.

The ORNL probability calculations were not based on intelligence estimates. As far as can be determined, the probability estimates used by the ORNL study did not take into account oil market or Middle East political, military, or economic factors that would underlie any significant oil supply disruption.

Putting the studies on a comparable basis (annual probability of a gross event) involves some reformulation of each study, so that none of the probability statements listed below can be found in the associated study.

- 1986 Interagency Study. The most clearly comparable statement of probability to the other studies is that a major disruption (gross 6 to 13 million barrels per day) had annual probabilities of 0,5, and 10 percent for optimistic, moderate, and pessimistic expectations.

- 1988 ORNL Study. The ORNL study probabilities are quarterly, but are embedded in complex "transition matrices" defined for each model. The major disruption cases are three: two of gross 10 and one of gross 15 million barrels per day with computed annual probabilities (for comparability with the 1986 and 1990 studies) of 3.9, 4.1, and 21.5 percent respectively.

- 1990 Interagency Study. The 1990 study probabilities are annual. For comparability with earlier studies that used point estimates of disruptions, major disruption ranges can be determined; two of gross 7.5 million barrels per day and larger, and one of gross 11.5 million barrels per day and larger with annual probabilities of 0.5, 1.1, and 0.6 percent representing optimistic, mid case and pessimistic expectations respectively.

The annual probabilities of disruption, the disruption sizes and the ratios of the probabilities relative to the probabilities used in the 1990 interagency study, are shown for all of the cases in the table on the following page.

COMPARISON OF PROBABILITY ESTIMATES OF SPR STUDIES

| | 1986 INTERAGENCY | | | 1988 ORNL | | | 1990 INTERAGENCY | |
|---|---|---|---|---|---|---|---|---|
| EXPECTATIONS | DISRUPTION (MMB/D) | ANNUAL PROBABILITY (PERCENT) | PROBABILITY RATIO*** (1986/1990) | DISRUPTION* (MMB/D) | ANNUAL PROBABILITY (PERCENT) | PROBABILITY RATIO*** (1988/1990) | DISRUPTION* (MMB/D) | ANNUAL PROBABILITY (PERCENT) |
| Optimistic | 13 ** | 0.0 | 0.0 | 10 | 3.9 | 8.2 | >7.5 | 0.5 |
| Mid case or Moderate | 13 ** | 5.0 | 4.6 | 10 | 4.1 | 3.8 | >7.5 | 1.1 |
| Pessimistic | 13 ** | 10.0 | 15.6 | 15 | 21.5 | 33.6 | >11.5 | 0.6 |

* "Worst-case" (1990), "severe" (1988), or "major" (1986).

** Estimated from documentation.

*** The number of times larger the probability is in the indicated study than in the 1990 study.

Note: All computations were done before rounding.

Under the 1988 study probability assumptions, there would be a 50/50 chance of a worst case net supply disruptions every I to 3 years. Whereas, under the 1990 study assumptions, the probability of such a worst case disruption does not reach 50 percent over the entire 30 year projected period of the study. Over the past 30 years, the largest interruption (the 1978/79 Iranian Revolution) was less than half the size of the smallest CIA-defined worst case for the 1990 study. Only the 1990 study used intelligence agency estimates of the size and likelihood of disruption; the 1988 study relied on contractor estimates while the 1986 study probabilities were negotiated estimates by eight participating agency staffs.

Excess Production Capacity

Excess production capacity has the capability to partially offset temporary reductions in supply.

- o 1986 Interagency Study. The 1986 study considered only excess capacity outside the Persian Gulf (0.5 to 3.0 million barrels per day) as relevant given their largest disruption scenario which is equal to the oil volume shipped through the Strait of Hormuz.

- o 1988 ORNL Study. In the 1988 ORNL study, less than half of the primary runs assumed that 3 to 5 million barrels per day of excess production capacity would come on line because the disruption was unintended (by suppliers). For the majority of the primary runs, even though excess capacity was expected to be available, it was assumed not to be produced because the disruption is assumed to be a politically motivated embargo.

- o 1990 Interagency Study. The 1990 interagency study included estimates of excess capacity over the study time frame, and used a range (low, mid, high) within the estimate to calculate excess production capacity available immediately in an interruption. Early years of the study were projected to have 2.0 to 6.5 million barrels of excess capacity, but beyond 2005, the range was 0.3 to 3.5 million barrels per day.

Excess capacity was considered an integral and explicit part of the 1986 and 1990 interagency studies, whereas, in the 1988 ORNL study, excess capacity had only limited effects and was not explicitly delineated. Production from excess capacity has been shown to be very effective in offsetting the effects of an oil supply disruption. Saudi Arabia's well publicized surge production of 2.5 million barrels per day during the 1978/79 Iranian Revolution served to largely offset the price effects from the initial shut-off of Iranian crude.

Foreign Strategic Stocks (Japan, West Germany et al.)

Foreign strategic stocks have the capability to offset temporary reductions in supply given the interdependent structure of the world oil market.

- o 1986 Interagency Study. Foreign stocks were considered to come on line at a rate of 1 to 2 million barrels per day throughout the period 1985-2000.

- o 1988 ORNL Study. The 1988 ORNL study did not take into account foreign strategic stocks in the primary runs.

- o 1990 Interagency Study. The 1990 interagency study assumed a range of drawdowns (1.0 to 3.5 million barrel per day rate until drawn down) of these strategic stocks for a range of worst case potential interruptions. Also, in the 1990 interagency study both the United States and foreign stock draws were assumed to begin at assumed rates on the first day of the interruption.

Drawdown of foreign strategic stocks during a major or worst-case disruption occurs in the 1986 and 1990 interagency studies. Foreign strategic stock draw downs were larger in the 1990 study than in the 1986 study because foreign strategic stocks are larger in 1990 (415 million barrels) than they were in 1986 (230 million barrels). Further, there are currently an additional 600 million barrels of foreign safety stocks mostly under government control that were not considered by the 1990 study to be available for use in a large disruption. In the 50 runs from which the cost-benefit estimates were drawn, the 1988 ORNL study assumed away any effects on the oil market from foreign strategic stock drawdown. Without market entry of foreign strategic stocks during a disruption, oil prices are higher and the net benefits of additions to the SPR are higher.

Fill and Drawdown Rate Optimization

Filling the SPR at maximum rates only when oil prices are low reduces SPR costs and raises net benefits.

- o 1986 Interagency Study. The 1986 study optimized fill and draw, thus significantly raising net benefits when probabilities of interruption are large.

- o 1988 ORNL Study. The 1988 ORNL study model tried to fill at maximum rates when oil prices were low without regard to budget, procurement constraints or DOE's ability to correctly know when oil prices were at low points. The model used in the ORNL study in effect added oil to the SPR during slack market times and drew down oil during disruptions, in the exact amounts necessary to

maximize net benefits, bounded only by the physical constraints of the system. The optimization procedure alone can add $1 billion to the net benefits computed by the ORNL model when combined with ORNL study probabilities.

- o 1990 Interagency Study. The 1990 interagency study specified annual fill rates based on approved annual budget levels during periods of low, moderate, and high prices, which is consistent with the way DOE has filled the SPR over the last 13 years.

The 1986 interagency study and the 1988 ORNL study used models that contributed benefits through modeling technique alone. The mathematical technique in these models derives the precise fill or draw in every period that minimizes the discounted, probability weighted net benefits from all future periods and substitutes this quantity as the likely fill or draw. The 1990 study, by contrast, complies with likely budgetary and political constraints by selecting fixed values for fill and draw.

F. OTHER ASSUMPTION COMPARISONS

Price Elasticities of Demand

Oil price elasticity of demand quantifies consumers' responses to changes in oil prices. In the context of this analysis, low price elasticities mean that consumers will not initially cut their oil consumption in an oil supply disruption, thus driving prices, and negative economic effects, to very high levels. High elasticities mean consumers initially cut oil consumption during a disruption thereby moderating the price rise.

- o 1986 Interagency Study. The 1986 study did not increase elasticity with disruption size, thus benefits are overstated.

- o 1988 ORNL Study. The 1988 ORNL study generally used a price elasticity of demand that did not change with the size of disruption, which overstates benefits.

- o 1990 Interagency Study. The 1990 interagency study, based on an extensive review of all available research, used a range of elasticities which increased with disruption size. As a consequence, for large disruption sizes, price would rise not as high and economic damage would be less severe than under the assumptions of the 1988 ORNL study.

The 1986 and 1988 studies made the simplifying assumptions that one elasticity is suitable for any size disruption over any length of disruption. The 1990 study, however, varied elasticity values over the size of disruption (the bigger the disruption, the larger the

elasticity) and over the length of the disruption (the longer the disruption goes on, the larger the elasticity). With ORNL probabilities, the net benefits in the 1988 ORNL study are about $1 billion higher because elasticities are assumed to remain fixed over size and length of disruption.

Disruption Durations

Long disruptions, relative to short ones, increase the benefits of additions to the SPR. The large historical disruptions (1973/74 Arab-Israeli War, the 1978/79 Iranian Revolution) lasted about six months.

- 1986 Interagency Study. The 1986 study evaluation period was likely quarterly and disruptions could be that length or longer, with disruptions beyond two quarters having lower probability.

- 1988 ORNL Study. In the 1988 ORNL study model, the evaluation period was quarterly and some disruptions lasted no more than that while others could be two, three, or more quarters long.

- 1990 Interagency Study. The 1990 interagency study assumed that when there was a disruption, it was of a fixed length of either 6 or 9 months.

The studies are roughly comparable in disruption duration length of about six months, which is consistent with the worst historical disruptions. The 1986 Interagency study claims an average duration of about six months, while the 1988 ORNL study used one quarter duration for the most severe category of disruptions but over two quarter duration for many of the less severe disruptions. The 1990 study used six months for most of its runs.

INTERACTION OF ASSUMPTIONS

While each of the assumptions in Sections E and F were examined as if they had largely independent effects, recent SPR model comparability efforts have shown that the effect a given assumption has on net benefits in part depends not only on its own value but also on the values of other assumptions in the sensitivity sequence. For example, using lower values of price elasticity of demand has much larger effects when the probabilities of disruption are high rather than low.

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Question 3. The SPR size study assumed that DOE would continue to acquire oil through direct purchase. Presumably, if the price of oil acquisition were low enough, an expansion from 750 million to one billion barrels would be cost-effective (holding all other size study assumptions constant). Provide an estimate of the cost of oil acquisition that would make a one billion barrel SPR cost-effective. Assume the cost of oil acquisition would take the form of an annual lease fee.

Answer

The Department believes that it is premature to conclude that, holding all other study assumptions constant, there would be terms and conditions negotiated for an SPR oil leasing arrangement which could alter the conclusions of the 1990 Interagency Study on the question of SPR size.

The portion of the 1990 Interagency size study which addresses the probability weighted net benefits of increasing the SPR size to one billion barrels provided a Mid-Case estimate under which the present value of costs for expansion was $3.37 billion and the present value of benefits was $.75 billion. (See page VI-2). The present value in 1990 of facilities development costs for SPR expansion was estimated to be $.7 billion in 1988 dollars, at a 10 percent real discount rate.

Therefore, the present value in 1990 of the costs for SPR oil acquisition would need to be no greater than $.05 billion in 1988 dollars.

If one assumes fill of the fourth 250 MMB at 75 MBD, starting in late 1996 and ending in late 2005, the present value in 1990 of a stream of annual payments of $1.00 per barrel per year (1988 dollars) through the year 2020 would be $773 million at a 10% discount rate. Accordingly, an annual lease payment would need to be approximately $.06 to $.07 per barrel per year ($1988) for the present value of oil costs plus facilities costs to equate to the present value of expected benefits. Using the inflation assumptions in the financing study, this would be equivalent to annual lease payments in nominal dollars of approximately $.08 to $.16 per barrel per year over the 1996-2020 period. At this point, we have no indications on what terms might be offered by producing countries.

In addition to ignoring the interrelationship between the cost of oil acquisition and the rate of SPR fill, this analysis tends to over-simplify both the SPR financing question and the economics of the size issue. First, one needs to consider the composition of benefits and costs. The principal form of analysis for the SPR size study included, as an SPR benefit, the sales proceeds for SPR oil sold during a major energy supply interruption. If the oil were leased, this benefit could be as low as zero instead of $.5 billion if ownership was vested in the lessor for drawdown purposes. Also, two factors were excluded in the mid-range estimate but were included in the sensitivity analysis:

- The resale value of SPR oil remaining in inventory at the end of the analysis period (2020), and

- The upward pressure which SPR oil purchases might exert on the costs of imported oil to the rest of the U.S. economy during SPR fill.

In assessing any "lease" arrangement, one would need to account not only for the annual payment but also for ownership of receipts at time of drawdown, ownership of remaining oil in SPR, and the increase in world oil prices during fill.

In addition, there may be costs incidental to SPR oil acquisition which are excluded from these calculations. In the SPR Alternative Financing Study, it was assumed that the U.S. Government as lessee might continue to be responsible for Cargo Preference Act compliance and other incidental costs. The 1990 Interagency size study did not include Cargo Preference Act compliance costs in the SPR cost/benefit calculations. Under some interpretations, these can be considered transfer payments within the U.S. economy from taxpayers to the shipping industry, rather than fundamental economic costs of strategic stockpiling. However, opinions may vary on this point, and contractual provisions regarding oil transportation would need policy attention.

Third, it is clear that a major consideration in the SPR size question is the degree of oil supply risk facing the United States. Two issues posed by the use of alternative financing methods for the fourth 250 MMB are: (a) what would be the U.S. assessment of risk in the mid-1990's when the actual decisions to acquire the fourth 250 MMB would be made and (b) what, if any, "feedback" effects (positive or negative) might there be between the manner in which the SPR oil is acquired and the level of risk. At this point in time, assessments of future risk perceptions or feedback effects would of necessity be highly speculative in nature.

In sum, the Department has concluded that it is extremely unlikely that any cost savings achieved by leasing will materially impact the cost/benefits study results.

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The CHAIRMAN. All right. Thank you very much, Mr. Gentile.

Next we will hear from Dr. Robert Reischauer, Director of the CBO.

**STATEMENT OF DR. ROBERT D. REISCHAUER, DIRECTOR, CONGRESSIONAL BUDGET OFFICE**

Dr. REISCHAUER. Thank you, Mr. Chairman. I appreciate the opportunity to appear before the Committee today. I will submit my prepared statement for the record and focus my remarks this afternoon on two questions.

The first is whether the expansion of the Strategic Petroleum Reserve should stop at 750 million or continue to 1 billion barrels. And the second is whether the government should purchase the additional oil for the SPR or lease this oil from a producer.

Many factors play a role in determining the appropriate size for the Strategic Petroleum Reserve. Among the more critical are: first, the likelihood that there will be a large supply disruption; second, the amount of offsetting supplies that would become available should this disruption occur; third, the response of oil demand to a supply emergency; fourth, the discount rate used to compare future costs and benefits; and fifth, the insurance premium that the nation is willing to pay for added energy security from a larger SPR.

For the most part these factors rest on judgments that involve a good deal of uncertainty. Let me say a few words about several of these factors by referring to the recent Department of Energy study.

The study recommended expanding the SPR to only 750 million barrels, which contrasts with the recommendation of the 1988 Oak Ridge study that endorsed an SPR of at least 1 billion barrels. A major reason for the different recommendations of the two studies is that the DOE study assumed a much lower probability of an oil supply disruption. The DOE study assumed that the annual probability of a severe disruption would be about 1 percent, while the Oak Ridge study assumed that the annual probability of a disruption of about the same size but somewhat shorter duration would range between 4 percent and 22 percent.

CBO can offer little help in assessing which of these two estimates of the likelihood of an oil supply disruption is more reasonable. Nevertheless the difference is critical, as can be seen from the fact that a 1 billion barrel SPR could be justified using the DOE's criterion if the annual probability of a severe disruption used in the DOE study was raised from 1 percent to 2 percent or 3 percent.

It is worth noting that the world has changed a great deal in the last few years, and even, in the last few months. Given these recent political changes and the importance of these probability calculations, it may make sense for the committee to ask the intelligence community for an updated assessment of the probability of an oil supply disruption.

The DOE study's recommendation also rests on its relatively large estimates of offsetting supplies. These offsets, which would be provided by excess production capacity in countries not affected by

the disruption, by inventories in other consumer countries, and by fuel switching, could significantly lessen the impact of a disruption.

DOE estimates that such offsets could amount to 7 million to 8 million barrels per day over the next decade, or about 10 percent to 12 percent of world production. However, the DOE view that such offsets will provide substantial protection for at least the next few years could be an understatement of some serious risks.

The excess capacity found in regions that are relatively invulnerable to disruptions could disappear more quickly than DOE has anticipated. With political changes in Eastern Europe and faster world economic growth, oil markets could tighten more rapidly than envisioned.

Other consumer countries could pare back their strategic stocks. Moreover, these stocks, as well as excess productive capacity, could be less responsive to a disruption than DOE has assumed. With lower offsets, any supply disruption would have a more severe impact, thereby justifying a larger SPR. For example, if offsets turned out to be 4 million barrels a day, rather than the 7 million barrels assumed by DOE, the difference between the costs and benefits of a 1 billion barrel SPR would be comparable to that for the 750 million barrel SPR that DOE has already endorsed.

In today's largely unregulated oil markets the economic harm from an oil supply disruption would not be caused by the inability of our industry or homes to buy oil, but rather by the effects of price increases needed to bring demand into line with supply.

While numerous economic studies have examined how price hikes would affect the economy, there is a good deal of uncertainty about how oil demand would respond to a sudden increase in prices. Experience has shown that oil companies do not immediately reduce their private inventories and oil users do not immediately reduce purchases in the face of a severe disruption.

They do just the opposite, adding to their inventories and filling their gas tanks—a response just may be quite rational considering that no one knows how long the disruption will last or how high prices will climb. But such actions can be destabilizing in the near term.

The DOE study has assumed that there would be no speculative price movements of this sort during a disruption. However, if this assumption is wrong, and prices were driven higher as a consequence of speculative incentives to hold oil, then the benefits of a larger SPR may be underestimated in the DOE study and a further expansion of the SPR may be warranted.

The real discount rate used to calculate the present values of costs and benefits in the DOE study is 10 percent. In CBO's view a more-appropriate discount rate would be 3 percent to 4 percent, because the discount rate used to estimate the present value of future benefits from government outlays should be commensurate with the real cost of government spending. That real cost is the cost of the private investment displaced, which is best measured by the real rate of return on longer-term government securities.

Even though the present value of measurable benefits rises more rapidly than that of costs as the discount rate is reduced, the difference between the costs and benefits of the 1 billion barrel SPR declines only marginally if the discount rate is reduced from the 10

percent used by DOE to the 3 percent or 4 percent level that CBO thinks is more appropriate.

Let me sum up my discussion of the sizing issue by saying that while CBO is not in a position to judge the soundness of the specific assumptions made by DOE in reaching its recommendation, that recommendation seems to be quite sensitive to the assumptions made about the likelihood of a disruption, the availability of additional supplies during a disruption, and the demand response to a disruption. It is relatively insensitive to the discount rate. Different but still plausible sets of assumptions could be used to justify either a larger or a smaller SPR.

Let me conclude by making three points about the second issue, which involves the relative merits of leasing rather than buying additional oil for the SPR.

The first of these points is that leasing oil will not have any effect on calculating of benefits from the SPR as long as the government has complete control over disposing of the leased oil. Thus the merits of leasing versus purchase and its relevance to the sizing issue must rest on cost considerations alone.

The second point is that the decision to lease oil should be based on economic costs, not on how lease costs are treated in the budget. The appropriate budgetary treatment of government leasing arrangements is still being decided by OMB, CBO, and the Budget Committees.

In general, CBO's position has been that budget scorekeeping should look beyond the specific form of a financial transaction and reflect instead the substance of the transaction. In other words, the budgetary treatment should reflect the Federal Government's true financial commitment.

For most lease-purchase arrangements this means counting the actual acquisition costs right away, rather than counting some artificially low annual lease payments that do not reflect the ultimate cost of federal ownership.

The third point is that unless the United States can negotiate a leasing agreement with another country that is willing to provide oil for the SPR at below-market rates, leasing oil for any significant period of time would almost certainly result in greater costs than direct federal purchase would. This is the case because the Federal Government has a lower borrowing cost than private financial entities.

While in the short term the government would be able to reduce its cash outlays by leasing rather than buying a commodity, over the longer period leasing is almost always more expensive than direct government purchase. Only under extraordinary circumstances—for example, if a producing country was willing to lease oil at substantially below a market rate—might this not be the case. Whether such opportunities exist is an open question.

However, it does not seem warranted to preclude attempts to acquire strategic reserves of oil by leasing, if that is the most economically efficient manner to acquire these oil reserves.

That concludes my statement. At the end of this panel, I will be glad to answer questions.

[The prepared statement of Dr. Reischauer and a subsequent submittal follow:]

Statement of
Robert D. Reischauer
Director
Congressional Budget Office

before the
Committee on Energy and Natural Resources
United States Senate

March 20, 1990

NOTICE
This statement is not available for public release until it is delivered at 2:00 p.m. (EST), Tuesday, March 20, 1990.

Mr. Chairman and Members of the Committee, I appreciate the opportunity to present the views of the Congressional Budget Office (CBO) concerning the size and financing of the Strategic Petroleum Reserve (SPR) as part of your hearings on the proposed Energy Policy and Conservation Act Amendments (S. 2088). CBO will also provide for the record of this hearing a Staff Memorandum covering a number of detailed questions raised by the Committee staff. I will focus here on two broad questions:

- Should the SPR be expanded from 600 million barrels to 750 million barrels only or further to 1 billion barrels?
- Should the government purchase the additional oil for the SPR or lease it from oil producers?

## BACKGROUND

The Energy Policy and Conservation Act of 1975 authorized a petroleum reserve with a minimum size of 500 million barrels and a maximum size of 1 billion barrels. The purpose of this SPR is to protect the U.S. economy and national security interests from the consequences of a severe disruption in oil supplies. That protection will come directly through the price-stabilizing effects of the sale of SPR oil. Since world oil prices will be reduced, all petroleum consumers in this country and in the world will benefit.

The SPR currently holds about 580 million barrels, enough to replace current net oil imports for about 80 days. However, the SPR facilities are designed to release oil at a maximum rate of 3.0 to 3.5 million barrels per day, or about half the current daily net imports. Administration policy has favored a reserve of 750 million barrels. That policy was first set in 1982, when net oil imports had reached a two-decade low of 4.3 million barrels per day. Since then net imports have grown nearly 50 percent.

## SIZE OF THE STRATEGIC PETROLEUM RESERVE

The Department of Energy (DOE) has completed a study that recommends expanding the SPR to only 750 million barrels. In contrast, the Oak Ridge National Laboratory completed a study more than a year ago that recommended expanding the SPR to 1 billion barrels or more. Both studies base their recommendations on cost-benefit analysis, using similar and appropriate methodologies. Their differences arise from judgments about uncertain future developments in world affairs, oil markets, and the economy. Both studies assumed the same discount rate.

The Likelihood of Disruptions

The SPR provides a measure of insurance against potential disruptions in world oil supplies. Such disruptions did occur in the 1970s as a result of political and military turmoil in the Middle East. Expanding the SPR reflects a concern that large oil supply disruptions may occur in the future. How large the strategic reserve should be depends on this likelihood. Expected benefits from an expanded SPR are directly proportional to the probability of large disruptions.

The DOE study assumes a much lower probability of an oil supply disruption than did the earlier Oak Ridge study. Based on an assessment of risks by the Central Intelligence Agency, the DOE study assumed that an annual probability of large disruptions would be about 1 percent. "Severe" disruptions were judged to be those accounting for 15 percent or more of the demand by market economies, or about 10 million barrels per day in 2010, and lasting six months. The figure for disruptions of a similar size in the Oak Ridge study would be a range of 4 percent to 22 percent, although Oak Ridge only considered three-month disruptions. Despite the difference in the expected duration of large disruptions, the DOE remains much more optimistic about energy security.

To underscore the importance of these assumptions, if the DOE probability of large disruptions were raised to 2 percent or 3 percent, an expansion of the SPR to 1 billion barrels would be justified using the criterion DOE used to accept the 750 million barrel SPR. Given the important consequences of these assumptions, the Committee may want to hear from those who make these assessments--in closed session, if necessary.

CBO can offer little help in assessing the reasonableness of the two estimates on the likelihood of disruptions in oil supply. It is worth noting, however, that the world has changed a great deal in the last few years and even the last few months. The end of the Iran-Iraq War has made the Persian Gulf, a region in which we feared oil supply disruptions for many years, a less volatile place. Oil-producing countries are increasingly investing in oil refining and marketing activities in consuming countries and, thus, have a greater interest in the stability of oil prices. Changes in Eastern Europe and the Soviet Union also suggest a politically more stable world in the future, although local conflicts that have been contained in the bipolar world may escalate in a multipolar environment.

The Availability of Offsetting Supplies

Even if political or military events were to cause oil supply to be disrupted in some regions of the world, an oil crisis might not develop. Excess production capacity and usable inventories of oil in other parts of the world could significantly lessen the severity of a disruption. These inventories include strategic reserves in West Germany and Japan and a portion of private stocks above minimum operating levels elsewhere. The limited ability of the United States to switch some uses from petroleum to other fuels on short notice can also help.

DOE estimates total offsets of these types at 7.5 million barrels per day currently, compared with total world production of about 65 million barrels per day. These offsets are assumed to remain large for at least the next five years and then to decline as world demand catches up with world production capacity (most of which is in the OPEC Gulf states). A noticeable loss of oil on world markets may not even be possible until after 2000 because of these offsets.

This view, however, appears to understate some serious risks. Will excess capacity continue in regions relatively invulnerable to disruptions, or will oil markets tighten more rapidly than DOE envisions? Will other consuming countries continue to hold large strategic stocks? And, most

important, will decisions be made to use excess capacity and stocks rapidly and fully in the event of a crisis? CBO has not conducted an independent analysis of these offsets, but a simple example illustrates the importance of these assumptions. Lower levels of offsets mean any disruption in supply will have a more severe impact. If DOE's assumed total offsets of about 7 million barrels per day (on average for the next 30 years) were cut to 4 million barrels per day, the difference in costs and benefits for the 1 billion barrel SPR would be comparable with that for the 750 million barrel SPR already endorsed by DOE.

Responses of the Economy

In today's largely unregulated oil market, the economic harm from a disruption in oil supply will not be caused by the inability of our industries and homes to buy oil, but rather by the effects of the price increase needed to bring demand into line with supply. Numerous economic studies exist on how movements in oil prices affect the economy and on how best to measure the benefits of government actions that would mitigate price increases. Both the DOE and the Oak Ridge studies reflect this thinking and use appropriate measures of the benefits from having a larger SPR available in the event of a disruption. But these measures depend on uncertain conjectures about how

the economy and demand for oil would respond to any sudden increase in oil prices.

Experience has shown that, in the face of severe disruptions, oil companies do not immediately reduce their private inventories and oil users do not immediately reduce purchases. In fact, they do just the opposite, adding to inventories and filling gas tanks. They respond in this way, of course, because they cannot know at the outset of a disruption how much supply will be lost, how long the disruption will last, or how high prices will rise. Speculative hoarding of oil can be a rational economic response and can reallocate supplies to later dates, when they will be needed more. But such actions can be destabilizing in the near term, as increased demand for storage drives prices up further and spurs more hoarding.

The growth of forward oil markets may have dampened speculative shifts in supply and demand by providing an alternative channel for speculating in or hedging against uncertain oil prices. Forward markets allow traders to buy or sell oil for future delivery at prices locked in today, so they can speculate by buying oil contracts rather than by hoarding oil. This system worked well when oil prices fell by more than 50 percent in early 1986 and, more recently, this past winter when record cold temperatures pushed up the demand for heating oil. There is always a question, however, of whether the market can accommodate the strains of a major disruption in oil supplies.

The DOE assumes there would be no speculative price movements during a disruption, despite the likelihood of such events. If prices were driven higher during a disruption than DOE assumes--perhaps as a consequence of speculative incentives to hold oil--then the benefits of a larger SPR may be underestimated in the DOE study and a further expansion of the SPR might be warranted.

Discount Rates

The benefits of an expanded SPR will come in future years after the costs of expanding the reserve have been incurred. To make a comparison of the benefits and costs that occur at different times, analysts reduce these figures to present-value terms using a real discount rate (that is, applied to inflation adjusted data). Two effects of discounting should be noted. First, for any given discount rate, the SPR benefits, which are more distant, will be lowered more than the SPR costs, which are more immediate. Second, lower discount rates result in higher discounted values, so that the ratio of benefits to costs will increase with a lower discount rate. Thus, the choice of a discount rate can be crucial for the outcome of the decision on expanding the SPR. However, the level of impact will depend on additional assumptions about

the rate at which the SPR is filled and the rate of growth in world oil prices, which also affect the relative timing of costs and benefits.

The real discount rate used by DOE and Oak Ridge is 10 percent, a rate encouraged by the Office of Management and Budget for use by the Executive Branch. CBO's view is that the discount rate used to estimate the present value of future benefits from government outlays should be commensurate with the real cost of government spending. That real cost is the cost of private investment displaced, measured as the real return (net of inflation) on longer-term government securities. That return indicates the rate of compensation required by the private sector (of late, the foreign private sector) to forgo its own investment. By this criterion, a more appropriate discount rate may be as low as 3 percent or 4 percent.

Given DOE's assumed SPR fill rate (75,000 barrels per day) and growth in real oil prices (3.5 percent), the difference between the costs and expected benefits of the 1 billion barrel SPR declines only marginally as the discount rate is lowered from 10 percent to 3 percent. The present value of measurable benefits does rise more rapidly than that of costs as the discount rate is reduced but would only approach costs at a near zero rate. Because both costs and benefits are influenced by growth in oil prices as well as by the discount rate, it is difficult to say how a change in the discount rate would affect the outcome of the cost-benefit analysis.

Could One Billion Barrels Be Justified?

An expansion of the SPR to 1 billion barrels rests most critically on several assumptions: the likelihood of large supply disruptions; the amount of offsetting supplies available from unaffected sources during a disruption; the response of demand for oil during a supply emergency; and the discount rate used to reduce future costs and benefits to present-value terms.

By DOE's own accounting, the costs of expanding the SPR from 600 million to 750 million barrels exceed the expected incremental measurable benefits by $1.06 billion (in 1988 dollars). In effect, this amounts to the insurance premium that the nation is willing to pay for the added security. The nonmeasurable benefits listed by DOE, which justify this higher cost, are described in terms of the deterrent value of the SPR and the protection of national security. If the 250 million barrel expansion to 1 billion barrels generated nonmeasurable benefits that were as great as those for the preceeding 150 million barrels, a 1 billion barrel SPR could be justified by any changes in assumptions that reduced the difference between costs and benefits on that final expansion to less than $1.06 billion.

CBO is not in a position to judge the soundness of specific assumptions. However, I have tried to indicate the sensitivity of DOE's results to the assumptions that are made about the likelihood of a disruption, the availability of additional oil supplies during a disruption, and the discount rate.

## LEASING OIL FOR THE STRATEGIC PETROLEUM RESERVE

In addition to the issue of appropriate size of the SPR, there is the question of how additions to the SPR should be financed. Recently, a good deal of attention has focused on the potential advantages to leasing rather than buying additional barrels of oil for the SPR. A federal lease is a contractual agreement by the government, as lessee, to pay some periodic rent for a building or commodity, while the lessor retains ownership. Two general approaches to oil leasing were considered by DOE. The first is lease/option, in which the United States would effectively be renting the oil it holds in storage, while retaining an option to buy that oil outright at any time of its choosing. The second is lease/purchase, in which the United States would lease the oil for a set number of years after which it would become the outright owner of the oil. Lease/purchase is a way of financing ownership over a number of years.

Three general points need to be made with respect to lease arrangements. First, oil leasing, with or without the option to buy, will not have any effect on the calculation of benefits from the SPR, so long as the terms of the lease leave the government with complete control over disposition of the leased oil. Thus, the merits of leasing versus purchase must rest on cost considerations alone. Second, the decision to lease oil should be based on economic costs, not necessarily on how lease costs are treated in the budget. In any case, the budgetary treatment of government leasing arrangements is still under discussion, and there is no assurance that a lease arrangement would necessarily have less of a budget impact than a straightforward purchase. Third, leasing oil for any significant period of time, such as a decade or more, would almost certainly result in greater cost than direct federal purchase, unless the U.S. government can negotiate a leasing agreement with another country that is willing to provide oil for the SPR at below-market rates.

Budgetary Treatment of Oil Leasing

The Congressional Budget Office, the Office of Management and Budget, and the Budget Committees of both Houses are currently working together to formulate principles for treating federal lease costs in the budget. In particular, this group is focusing on the budgetary treatment of multiyear

contracts, such as lease/purchases for federal buildings. Leasing oil, with or without the option to buy, could be treated similarly to lease/purchases of buildings in at least some cases. The key issue is the government's long-term commitment.

In general, CBO's position has been that budget scorekeeping should look beyond the specific form of a financial transaction (for example, government lease) and instead reflect the substance of a transaction. Budgetary treatment should reflect the federal government's true financial commitment. For many lease/purchase arrangements, this means counting the actual acquisition costs right away, rather than counting some artificially low, annual lease payments that do not reflect the true cost of federal ownership. However, this is not a closed case.

The concern over the size of the SPR is more about the long-term security of oil supplies than it is about market events in the near term. Thus, no matter what the duration of any lease arrangement for filling the SPR, the mechanism can be looked on as a long-term commitment if the United States exercises full control over the disposition of that oil. In leasing oil, the government is effectively acquiring the oil when it takes possession of it. It can be argued that the budget should record budget authority and outlays that are equal to the greater of (1) the full purchase price of the oil or (2) the total payments required by the lease. If this were done, a lease would have

a smaller budgetary impact than a straightforward purchase only if the leasing actually resulted in the United States acquiring oil at a lower cost.

Economic Costs of Leasing Versus Buying

Because the federal government has a lower cost of borrowing than private financial entities, the least costly approach for most capital acquisitions by the federal government is a direct purchase using regular Treasury financing. In the short term, the government would be able to reduce its cash outlays by leasing rather than by buying a commodity. Over a long period, however, leasing buildings or commodities is almost always more expensive than direct government purchase.

Only under extraordinary circumstances might it be cheaper for the government to lease than to buy. Such circumstances could exist in the case of potential oil leasing for the SPR if any countries were willing to lease oil at below-market rates. Any cost concessions could result in lower federal costs of reaching and maintaining a given reserve size. However, potential lease arrangements and future oil market conditions both entail significant uncertainties, and these uncertainties make it impossible either to endorse or simply to dismiss the possibility of oil leasing.

Because many oil-exporting countries have unused production capacity and oil production costs that are considerably below the current world price for oil, some countries may be willing to lease oil to the U.S. government at below-market costs. OPEC countries, for example, could conceivably export volumes of oil for lease that are in excess of the cartel's agreed quotas for oil sales, while providing that oil at an effective cost below the market price. However, there is certainly no guarantee of such cost concessions. Along these lines, the possibility of a favorable lease arrangement assumes that the OPEC cartel does not significantly change its current quota system in a way that would limit the incentives of producers to lease oil.

In contrast, the U.S. government would probably incur leasing costs that were comparable with market prices if it were to lease oil competitively from private firms. CBO agrees with the DOE conclusion that a long-term competitive lease of oil would be likely to have a greater cost than direct purchases. Other means of financing reviewed in the DOE report do not show any promise for further reducing real federal spending for the SPR. Regular Treasury financing of direct federal purchase already provides the least costly method.

Terms of Potential Oil Leases

The lease terms for oil and for oil storage facilities could raise a number of public policy issues. The DOE report examined several issues, including whether the authority to sell leased oil leaves the United States with effective control over the oil, and whether other laws and regulations related to oil imports should apply.

Some oil-producing countries have apparently expressed interest in retaining some option to get their oil back when the lease expires at some price agreed to in the lease. Beside the obvious but not insurmountable concern this would pose for the full U.S. control of its SPR and the physical damage that repeated oil release could cause to the SPR facilities, CBO does not see the necessity of physically returning oil. If oil producers see potential profits in leasing oil, those profits could be achieved by taking possession of any comparable quality (or appropriately discounted) oil that the United States could acquire on open markets and deliver under terms of the lease. In any case, the option to release SPR oil into the market at any time should rest exclusively with the United States.

With respect to issues regarding the applicability of other laws and regulations, CBO sees no compelling reason why the government should exempt itself from such restrictions unless it results in some major cost

concessions. Cargo preferences, environmental impact statements, normal contractual procedures, and import duties and charges are all well-intentioned programs with clear policy objectives. For example, legislative requirements for the use of U.S. flag vessels are based on national security concerns (maintaining a viable merchant fleet), on safety and environmental concerns, and on a desire to benefit U.S. shipping. Before any significant volume of oil imports is excused from the 50-percent U.S. flag shipping requirement mandated by the Cargo Preference Act for SPR acquisitions, careful consideration would have to be given to whether the cost advantages would outweigh the consequences for national security and safety.

CBO has not studied the advantages and disadvantages of exempting lessors of oil from federal or local taxes. Tax exemption can be a powerful tool for channeling investments and would probably ensure some cost concessions from oil producers. But these concessions might not make up for the loss of federal revenues, which would increase the deficit. In addition, it is difficult to see how a change in tax laws could discriminate between national and private oil companies in this area--exempting only oil-producing countries--without encouraging creative maneuvers for subverting its intent.

## CONCLUSIONS

CBO does not find any significant difference between the basic cost-benefit methodology used by DOE and that used in other recent studies in coming to its conclusion that the SPR be filled only to 750 million barrels. DOE's recommendation that the SPR not be expanded to 1 billion barrels rests on key assumptions related to the likelihood of large supply disruptions; the amount of offsetting supplies that may be available from unaffected sources during a disruption; and the response of demand for oil during a supply emergency. I have described the alternative assumptions that demonstrate how critically the recommendation for expanding the SPR depends on DOE's assessment in those areas.

Given any particular goal for oil stocks, the federal government should acquire oil for the reserve in the most economically efficient manner. As DOE suggests, leasing oil directly from another country could result in real economic savings under certain favorable assumptions. Therefore, it does not seem warranted to discourage attempts to acquire strategic reserves of oil by leasing. CBO believes that the budgetary treatment of any lease should reflect the true federal costs of oil. If obtaining oil through a leasing arrangement that provides real economic savings to the government were possible without hampering the ability of the President to respond to energy emergencies, that option should be undertaken. A proper system of budgetary accounting would

recognize such savings. Similarly, if oil leasing ultimately costs more than direct purchases of oil, the budget should reflect such costs.

CONGRESSIONAL BUDGET OFFICE
U.S. CONGRESS
WASHINGTON, D.C. 20515

Robert D. Reischauer
Director

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Honorable J. Bennett Johnston
Chairman
Committee on Energy and Natural Resources
United States Senate
Washington, D.C. 20510

Dear Mr. Chairman:

Attached is a memorandum that expands on our testimony before your committee on March 20, 1990, on the size and financing of the Strategic Petroleum Reserve.

I hope you find this material useful. Please feel free to contact me should you have questions.

Sincerely,

Robert D. Reischauer

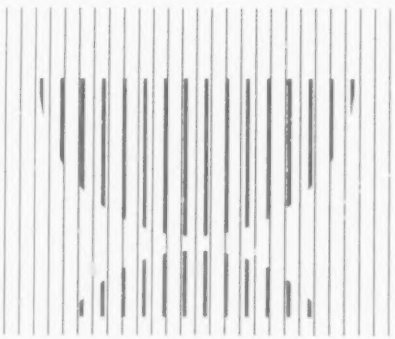
Attachment

cc: Honorable James A. McClure
Ranking Minority Member

# CBO STAFF MEMORANDUM

THE SIZE AND FINANCING OF
THE STRATEGIC PETROLEUM RESERVE

April 1990



THE CONGRESS OF THE UNITED STATES
CONGRESSIONAL BUDGET OFFICE
SECOND AND D STREETS, S.W.
WASHINGTON, D.C. 20515

This memorandum provides additional details relating to the testimony by the Director of the Congressional Budget Office (CBO) on the size and financing of the Strategic Petroleum Reserve (SPR). The testimony was given before the Senate Committee on Energy and Natural Resources at its hearings on the proposed Energy Policy and Conservation Act Amendments (S. 2088) on March 20, 1990. The analysis was done by Richard Farmer of CBO's Natural Resources and Commerce Division (NRCD) with assistance on financing issues from Pete Fontaine, Robert Sunshine, and Gail Del Balzo. The memorandum was prepared under the supervision of Roger Hitchner, Unit Chief for Natural Resources, and W. David Montgomery, Assistant Director for NRCD. Questions concerning the analysis should be directed to Richard Farmer at 226-2965.

## INTRODUCTION

At the request of the Senate Energy and Natural Resources Committee, the Congressional Budget Office (CBO) reviewed two recent reports prepared by the Department of Energy (DOE) that examined the size and financing of the Strategic Petroleum Reserve (SPR). The DOE reports were *Strategic Petroleum Reserve: Analysis of Size Options* (February 1990) and *Report to the Congress on Alternative Financing Methods for the Strategic Petroleum Reserve* (February 1, 1990). CBO's analysis of the size and financing of the SPR focuses on two broad questions:

- Should the SPR be expanded from 600 million barrels to 750 million barrels only, or further to 1 billion barrels?
- Should the government purchase the additional oil for the SPR, or lease it from oil producers?

CBO's review of the issues on SPR size was intended to help identify and assess the key assumptions that support DOE's conclusion that the SPR should not be expanded to 1 billion barrels. Since no controversy appeared over the interim decision to expand the SPR to 750 million barrels, this memorandum focuses on the merits of the incremental 250 million barrels. This increment represents 42 days of oil supply at current oil import levels (24 days at levels forecast for 2010).

CBO's review of the issue of financing the SPR reflects, for the most part, its views on the proper treatment of oil leasing in the federal budget. Since no specific leasing agreements are available for consideration, this memorandum concentrates on the general merits of leasing and on the pros and cons of some legislative changes that might be required before implementing a leasing program.

CBO's analysis of SPR size and of leasing excludes evaluations of DOE's policy on releasing SPR oil; questions on the best mix of crude oils needed for the reserve; the location of storage facilities; or the need for regional inventories of oil products. In addition, the analysis makes no attempt to evaluate the benefits to national security of a further expansion of the SPR.

## SIZE OF THE STRATEGIC PETROLEUM RESERVE

The DOE report on SPR size recommends that the SPR not be expanded to 1 billion barrels. This finding stands in sharp contrast to those of a report prepared for DOE by Oak Ridge National Laboratory just over one year earlier.[1] Whereas the present DOE report concludes that the measurable costs of expanding the reserve exceed the benefits by a wide margin ($3.4 billion total costs versus $0.75 billion gross benefits in expanding from 750 million barrels to 1 billion barrels), the earlier Oak Ridge report presented the opposite finding.[2] The assumptions and methodologies that led

1. Paul N. Leiby and Russell Lee, Preliminary Results of the SPR Size Cost-Benefit Study, Oak Ridge National Laboratory, November 17, 1988.

2. Costs indicate present value, in 1988 dollars.

this more recent DOE report to such a different recommendation are worth examining.

In general, CBO does not find any significant difference between the basic cost-benefit methodology used by DOE and that used in other recent reports. The desirability of an expansion of the SPR to 1 billion barrels rests most critically on several assumptions: the likelihood of large supply disruptions, the amount of offsetting supplies available from unaffected sources during a disruption, and the demand for oil during a supply emergency.

By DOE's own accounting, the costs of expanding the SPR from 600 million barrels to 750 million barrels exceed the expected incremental measurable benefits by $1.06 billion (in 1988 dollars). In effect, this amount represents the insurance premium that the nation is willing to pay for the added security. The nonmeasurable benefits listed by DOE, which justify this higher cost, include the deterrent value of the SPR and the protection of national security. If the 250 million barrel expansion from 750 million barrels to 1 billion barrels generated nonmeasurable benefits that were as great as those for the preceding 150 million barrels, a 1 billion barrel SPR could be justified by any changes in assumptions that reduced the difference between costs and benefits on that final increment to less than $1.06 billion.

CBO is not in a position to judge the soundness of specific assumptions. The following sections of this memorandum, however, indicate the sensitivity of DOE's results to assumptions on the likelihood of a disruption, the costs and benefits of the SPR, the discount rate, and the market response to a disruption in oil supply.

## Reasons for a Strategic Petroleum Reserve

The Energy Policy and Conservation Act of 1975 authorized a petroleum reserve with a minimum size of 500 million barrels and a maximum size of 1 billion barrels. The SPR currently holds about 580 million barrels, enough to replace current net oil imports for about 80 days. Current SPR facilities, however, can release oil into the market at a maximum rate of 3.0 million to 3.5 million barrels per day, or about one-half the current daily net imports. Administration policy has favored a reserve of 750 million barrels. That policy was first set in 1982, when net oil imports had reached a two-decade low of 4.3 million barrels per day. Since then, net imports have grown nearly 50 percent.

The purpose of the SPR is to provide the nation with insurance against the threat a major disruption in oil supply poses for the economy and for national security. In today's largely unregulated domestic oil market, that harm would come not through the inability of the nation's industries and homes to buy oil, but rather through the effects of the price increase needed to clear the market. Even with the price and allocation controls that were in place during the 1974 Arab oil embargo and the 1979-1980 Iranian Revolution, sufficient additional supplies were able to reach the United States. Significant damage to the U.S. economy was caused, however, by the quadrupling and then doubling of world oil prices during those two periods. Numerous studies have confirmed the link between oil price shocks and economic growth. For example, the Energy Modeling Forum reported the average result for a group of macroeconomic models and estimated that U.S. gross national

product would decline by 2.5 percent in the first year after a 50 percent increase in oil prices.[3]

The availability of strategic reserves of crude oil during a disruption provides two clear economic benefits. First, releasing these stocks in an emergency serves to moderate the rise in oil prices caused by a disruption in oil supply and, thereby, mitigates its impact on the economy. Second, less oil is imported at inflated prices. Other, less readily quantifiable benefits may result from deterring disruptions and guarding national security interests.

## Determining the Size of the Strategic Petroleum Reserve

Agreement that the federal government should maintain strategic reserves of crude oil still leaves policymakers with the decision of how large those reserves should be. The optimal size should balance the costs of building a reserve with the economic and noneconomic benefits to be expected during a disruption. Those costs include the direct cost of purchasing the oil and storing it. Costs to the public also include any increase in the cost of oil attributable to the effect of increased SPR demand on world oil prices.

The measurable expected benefits include the lowered cost of oil imports during a disruption (from lowered oil prices and lowered oil import levels as SPR oil is sold) and the reduced economic disruption as a result of lowered oil prices. The federal government has decided that government-owned reserves, rather than government-mandated or subsidized additions to private reserves, are the best way to realize these benefits.

If there were complete certainty about the future, the government's decision about the best size of the SPR would reflect the simple economic ranking of net benefits to be derived from different reserve levels. Given any level of uncertainty about the future, however, the optimal size of the reserve will be larger than this simple ranking would indicate. This increased size reflects the insurance premium that the country is willing to pay to mitigate the risks of a net loss from a disruption in oil supply. The difficulty in selecting the optimal size for the SPR comes from uncertainty about the economic parameters needed to evaluate the costs and benefits of a reserve and about the likelihood of a disruption.

Analysis of how large the reserve should be requires assumptions about the likelihood of disruptions in oil supply. Usually an array of assumptions is presented, showing different sizes of disruptions occurring with different probabilities. The analysis further requires analytical judgments about how the disruptions would affect oil markets and the economy. Finally, the analyst estimates expected costs and benefits for a given size of the reserve. The procedure of cost-benefit accounting is well established. However, disagreement remains among analysts as to what costs or benefits should be included in the analysis and how they should be estimated.

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3. Energy Modeling Forum, Macroeconomic Impacts of Energy Shocks: A Summary of the Key Results (Stanford University, Stanford, Calif., 1987).

In all these areas--the likelihood of a disruption, the response of oil markets and the economy in general, and the accounting of costs and benefits--the analyst's assumptions can have a profound impact on the outcome: whether and how much to expand the SPR.

The Likelihood of a Disruption

How much does the country need to worry about disruptions of oil supplies large enough to require a sale of SPR oil? Given DOE assumptions about available offsets to supply and demand in an emergency (increased domestic oil production, use of foreign inventories, and fuel switching), only the biggest and least likely disruptions would trigger a SPR release. Expected benefits from an expanded SPR are directly proportional to the probability of large disruptions.

The DOE report on SPR size assumes a much lower probability of a disruption in oil supply than did the earlier Oak Ridge report. Based on an assessment of risks by the Central Intelligence Agency, the DOE report assumed that an annual probability of large disruptions would be about 1 percent. Severe supply disruptions were judged to be those amounting to 15 percent or more of the demand by market economies, or about 10 million barrels per day in 2010, and lasting six months. One example of such an event would be the closing of the Straits of Hormuz through which 10.5 million barrels of oil pass daily. The Oak Ridge report assumed the probability of such a large disruption to be in the range of 4 percent to 22 percent, although Oak Ridge only considered three-month disruptions. Despite DOE's longer expected duration of large disruptions, the DOE assessment is much more optimistic about energy security.

To underscore the importance of these assumptions, if the probability of large disruptions was raised to 2 percent or 3 percent, an expansion of the SPR to 1 billion barrels would be justified using the DOE criterion for accepting the 750 million barrel SPR.

CBO can offer little help in assessing the reasonableness of estimates of the likelihood of disruptions in oil supply. Nevertheless, the large difference between the DOE and the Oak Ridge reports--and the important consequence of the differences in their assumptions about the probability of disruptions--requires some effort toward a consensus. How secure is the world oil supply and why? How well does the DOE report reflect that sense of security (or insecurity)? The Committee may wish to hear from those who make these assessments.

It is worth noting, however, that the world has changed a great deal in the last few years and even in the last few months. In particular, important structural changes have taken place since the supply disruptions of 1974 and of 1979 and 1980 that may have significantly reduced the likelihood of large disruptions resulting from political or military events. These changes include the greater diversity of petroleum sources today, the greater flexibility of oil consumers in conserving energy and in choosing between forms of energy, the growing investment by OPEC members in consuming nations (both in oil refining and marketing and in the general economy), better cooperation by consumer nations through the sharing agreements of the International Energy Agency, and the end of hostilities between Iran and Iraq.

easing of East-West tensions may also carry over to the Middle East. In the future, the growth of free-market institutions in Eastern Europe and the Soviet Union may add to world oil supply and flexibility in demand. (However, local political conflicts that have been contained in the bipolar world may escalate in a multipolar environment).

Costs and Benefits of a Strategic Petroleum Reserve

Before assessing DOE's economic assumptions, it will be useful to identify the social costs and benefits attributable to an expansion of the SPR. The major costs are those of acquiring and storing crude oil. Estimates of the present value of the costs of acquiring oil depend most directly on assumptions about the future path of world oil prices. (Additional important assumptions about fill rates and discount rates will be discussed at the end of this section.)

While CBO is more inclined to accept a forecast of oil prices that increase slowly in real terms, the difference between DOE's assumed mid- and low-price paths implies a cost saving of only $0.6 billion (in 1988 dollars)--not enough to argue for expanding the reserve, which would require savings of at least $1.6 billion. The effect of SPR purchases on world oil prices would be small.

In measuring benefits from an expanded SPR in the event of a disruption, the United States derives an immediate gain from the reduced outlay for imported oil. This gain is a consequence both of lower import levels while the SPR is being drawn and of lower prices on all oil imports that result from adding the drawdown to world oil supply. The reduction in the import bill also reflects federal revenues from the sale of reserves. To what degree these revenues would benefit the U.S. economy depends on how the increased federal income is used--whether to offset federal deficits or to reduce taxes and increase the purchasing power of consumers during the disruption. (Most studies assume full offset to the deficit, as does the DOE report.) In terms of welfare economics, the lower value of oil imports results in fewer economic resources being transferred abroad. Assuming full employment of labor and capital resources, the U.S. economy would gain dollar for dollar from lowered imports.

Other major benefits relate to the economic losses that would be avoided in the event of a disruption. These benefits are measured in most studies in terms of gross national product. An expanded SPR would mean that the domestic economy would incur smaller real adjustment costs in transferring resources away from oil-consuming activities and regions. Adjustment costs would be reflected in higher unemployment rates and lower capacity use in industry. This avoided loss would be minus any incremental benefit forgone by the nation's oil-producing regions.

CBO concurs with this basic definition of the measurable economic costs and benefits of an expanded SPR. As noted earlier, however, widely different views are likely on the disruptions in oil supply of various sizes and durations. Probabilities of disruptions affect the calculation of expected benefits of the reserve. Different views also exist about the discount rates used to compare costs and benefits from different years.

Present-Value Discounting of Costs and Benefits

The benefits of an expanded SPR will come in future years after the costs of expanding the reserve have been incurred. To compare the benefits and costs that occur at different times, analysts reduce these figures to present-value terms using a real discount rate (that is, applied to inflation-adjusted data). Two effects of discounting should be noted. First, for any given discount rate, the SPR benefits, which are more distant, will be lowered more than the SPR costs, which are more immediate. Second, lower discount rates result in higher discounted values, so that the ratio of benefits to costs will increase with a lower discount rate. Thus, the choice of a discount rate can be crucial for the outcome of the decision on expanding the SPR. The level of impact will depend, however, on additional assumptions about the rate at which the SPR is filled (the fill rate) and the rate of growth in world oil prices, which also affects costs and benefits over time.

The real discount rate used by DOE and Oak Ridge is 10 percent, a rate encouraged by the Office of Management and Budget (OMB) for use by the Executive Branch. CBO's view is that the discount rate used to estimate the present value of future benefits from government outlays should be commensurate with the real cost of government spending. That real cost is the cost of private investment displaced, measured as the real return (minus inflation) on longer-term government securities. That return indicates the rate of compensation required by the private sector (of late, the foreign private sector) to forgo its own investment. By this criterion, a more appropriate discount rate may be as low as 3 percent or 4 percent. Without changes in other DOE assumptions, however, lowering the discount rate may not, by itself, change the outcome of the cost-benefit analysis.

Given DOE's assumed SPR fill rate (75,000 barrels per day) and growth in real oil prices (3.5 percent), the difference between the costs and expected benefits of a reserve with 1 billion barrels declines only marginally as the discount rate is lowered from 10 percent to 3 percent. The present value of measurable benefits does rise more rapidly than costs as the discount rate is reduced but would only approach costs at a near-zero rate. This insensitivity of relative costs and benefits to the discount rate depends on other assumptions about growth in oil prices and the rate at which oil is added to the SPR. Different combinations of assumptions may yield different results.

In the DOE analysis, lowering the growth rate of oil prices lowers the present value of acquisition costs by $0.6 billion (in 1988 dollars) but leaves the present value of benefits almost unchanged (since the change in oil prices during a disruption is assumed not to depend on the price of oil before the disruption). Raising the growth rate of oil prices raises costs and still leaves benefits unchanged. Lowering the SPR fill rate from 75 thousand to 50 thousand barrels per day would result in a drop of $0.7 billion (in 1988 dollars) in the present value of the costs of acquiring oil, but would also lower gross benefits by $0.2 billion since fewer reserves would be available for emergencies early on. The net effect of a lower fill rate is that benefits increase relative to costs, making an expansion of the SPR more attractive. Alternatively, raising the fill rate to 100 thousand barrels per day would increase costs relative to benefits, making expansion less attractive.



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Oil Market and Macroeconomic Response to a Disruption

In today's oil market, the economic harm from a disruption in oil supply will be caused by the effects of the price increase needed to bring demand in line with supply. Numerous economic studies exist on how movements in oil prices affect the economy and on how best to measure the benefits of government actions that would mitigate price increases. Both the DOE and the Oak Ridge reports reflect this thinking and use appropriate measures of the benefits from having a larger SPR available in the event of a disruption. But these measures depend on uncertain conjectures.

Different studies make different assumptions about how oil supply and demand will respond to significant disruptions in oil prices and about how the national economy will respond to changes in the oil market. These economic responses form the basis of the estimates of benefits discussed previously. DOE's approach may result in some underestimation of the impact of a disruption on oil prices and, hence, on the level of SPR benefits.

On the supply side, even if political or military events were to cause a disruption in oil supplies from some regions of the world, an oil crisis might not develop. Excess production capacity and usable inventories of oil in other parts of the world could significantly offset or lessen the severity of a disruption. These inventories include strategic reserves in West Germany and Japan and a portion of private stocks above minimum operating levels elsewhere. The limited ability of the United States to switch some petroleum uses to other fuels on short notice can also help lessen a disruption.

DOE currently estimates these total offsets at 7.5 million barrels per day, compared with total world production of about 65 million barrels per day. These offsets are assumed to remain large for at least the next five years and then to decline as world demand catches up with world production capacity, most of which is in the OPEC Gulf states. A noticeable loss of oil on world markets may not even be possible until after 2000 because of these offsets.

This assessment of available offsets to a supply disruption, however, appears to understate some serious risks. Will excess capacity continue in regions relatively invulnerable to disruptions, or will oil markets tighten more rapidly than DOE envisions? Will other consuming countries continue to hold large strategic stocks? And, most important, will decisions be made to use excess capacity and stocks rapidly and fully in the event of a crisis? CBO has not conducted an independent analysis of these offsets, but a simple example illustrates the importance of these assumptions. Lower levels of offsets mean any disruption in supply will have a more severe impact. If DOE's assumed total offsets of about 7 million barrels per day (on average for the next 30 years) were cut to 4 million barrels per day, the difference in costs and benefits for the 1 billion barrel SPR would be comparable with that for the 750 million barrel SPR already endorsed by DOE.

On the demand side, one cannot overstate the importance of reactions by oil companies and consumers to rapidly rising oil prices. Experience has shown that, in the face of severe disruptions, oil companies do not immediately reduce their private inventories and oil users do not immediately reduce purchases. In fact, they

do just the opposite, adding to inventories and filling gas tanks. They respond in this way, of course, because they cannot know at the outset of a disruption how much supply will be lost, how long the disruption will last, or how high prices will rise. Speculative hoarding of oil can be a rational economic response and can reallocate supplies to later dates, when they will be needed more. But such actions can be destabilizing in the near term, as increased demand for storage drives prices up further and spurs more hoarding.

The DOE report assumes no speculative price movements during a disruption, despite the likelihood of such events. If prices were driven higher during a disruption than DOE has assumed--perhaps as a consequence of speculative incentives to hoard oil--then the benefits of a larger SPR might turn out to have been underestimated in the DOE report. Consequently, a further expansion of the SPR might be warranted.

The growth of forward oil markets may have dampened speculative shifts in supply and demand by providing an alternative channel for speculating in or hedging against uncertain oil prices. Forward markets allow traders to speculate by buying oil contracts rather than by hoarding oil. This system worked well when oil prices fell by more than 50 percent in early 1986 and, more recently, this past winter when record cold temperatures pushed up the demand for heating oil. The question remains whether the market can accommodate the strains of a major disruption in oil supplies.

The cost-benefit accounting described here is an approach to evaluating insurance, such as provided by the SPR, that is neutral with respect to attitudes toward risk. Decisionmakers who are averse to risk would be willing to incur an additional cost (or insurance premium) to reduce the uncertainty about future levels of oil prices. DOE may have taken this approach in recommending that the SPR be raised to 750 million barrels, even though measurable costs exceeded benefits by $1.06 billion for that expansion. This $1.06 billion could be viewed as an insurance premium.

## LEASING OIL FOR THE STRATEGIC PETROLEUM RESERVE

The question also arises as to how additions to the SPR should be financed. Recently, a good deal of attention has focused on the potential advantages of leasing rather than buying additional barrels of oil for the SPR. A federal lease is a contractual agreement by the government, as lessee, to pay some periodic rent for a building or commodity, while the lessor retains ownership.

Two general approaches to oil leasing were considered in the DOE report on SPR financing. The first is lease/option, in which the United States would effectively rent the oil it holds in storage, while retaining an option to buy that oil outright at any time of its choosing. The second is lease/purchase, in which the United States would lease the oil for a set number of years after which it would own the oil. Lease/purchase is a way of financing ownership over a number of years.

Lease arrangements raise three issues. First, oil leasing, with or without the option to buy, will not have any effect on calculating the benefits from the SPR so

long as the terms of the lease leave the government with complete control over disposing of the leased oil. Thus, the merits of leasing versus purchasing must rest on cost considerations alone. Second, the decision to lease oil should be based on economic costs and not necessarily on how lease costs are treated in the budget. In any case, the budgetary treatment of government leasing is still under discussion; a lease arrangement would not necessarily have less of a budgetary impact than an outright purchase. Third, leasing oil for any significant period of time, such as a decade or more, would almost certainly result in greater costs than would direct federal purchase, unless the U.S. government can negotiate a leasing agreement with another country for oil at below-market rates.

Budgetary Treatment of Oil Leasing

CBO, OMB, and the Budget Committees of both Houses are currently working together to formulate principles for treating federal lease costs in the budget. In particular, these agencies are focusing on the budgetary treatment of multiyear contracts, such as lease/purchases for federal buildings. Leasing oil, with or without the option to buy, could be treated similarly to lease/purchases of buildings in at least some cases. The key issue is the government's long-term commitment to hold on to the oil it leases.

In general, CBO's position has been that budget scorekeeping should look beyond the specific form of a financial transaction (for example, government leases) and instead reflect the substance of a transaction. Budgetary treatment should reflect the federal government's true financial commitment. For many lease/purchase arrangements, this means counting the actual costs of acquisition right away, rather than counting some artificially low, annual lease payments that do not reflect the true cost of federal ownership. However, this is not a closed case.

The concern over the size of the SPR is more about the long-term security of oil supplies than about near-term market events. Thus, no matter what the duration of any lease arrangement for filling the SPR, the mechanism can be looked on as a long-term commitment if the United States exercises full control over disposing of that oil. In leasing oil, the government is effectively acquiring the oil when it takes possession of it. One can argue that the budget should record budget authority and outlays that are equal to the greater of (1) the full purchase price of the oil or (2) the total payments required by the lease. If this were done, a lease would have a smaller budgetary impact than an outright purchase only if the leasing actually resulted in the United States acquiring oil at a lower cost.

Economic Costs of Leasing Versus Buying

Because the federal government has a lower cost of borrowing than private financial entities, the least costly approach for most capital acquisitions by the federal government is a direct purchase using regular Treasury financing. In the short term, the government would be able to reduce its cash outlays by leasing rather than by buying a commodity. Over the long term, however, leasing buildings or commodities is almost always more expensive for the government than direct purchase.

Only under extraordinary circumstances would it be cheaper for the government to lease than to buy. Such circumstances could exist in the case of potential oil leasing for the SPR if any countries were willing to lease oil at below-market rates. Any cost concessions could result in lower federal costs of reaching and maintaining a given reserve size. Potential lease arrangements and future oil market conditions both entail significant uncertainties, however, and these uncertainties make it impossible either to endorse or simply to dismiss the possibility of oil leasing.

Because many oil-exporting countries have unused production capacity and oil production costs that are considerably below the current world price for oil, some countries may be willing to lease oil to the U.S. government at below-market costs. OPEC countries, for example, could conceivably export volumes of oil for lease that exceed the cartel's agreed quotas for oil sales, while still providing that oil at a lease cost effectively below the market price for sales. In any case, there is certainly no guarantee of such cost concessions. Along these lines, however, the possibility of a favorable lease arrangement assumes that the OPEC cartel does not significantly change its current quota system in a way that would limit the incentives of its members to lease oil.

In contrast, the U.S. government would probably incur leasing costs that were comparable with market prices if it were to lease oil competitively from private firms. CBO agrees with the DOE conclusion that a long-term competitive lease of oil would be likely to have a greater cost than a direct purchase. Other means of financing reviewed in the DOE report do not show any promise for further reducing real federal spending for the SPR. Regular Treasury financing of direct federal purchase already provides the least costly method.

Terms of Potential Oil Leases

The terms for leasing oil and oil storage facilities could raise a number of public policy issues. The DOE report examined several issues, including whether the authority to sell leased oil leaves the United States with effective control over the oil and whether other laws and regulations related to oil imports should apply.

Some oil-producing countries have apparently expressed interest in retaining some option to get their oil back at some price agreed to in the lease when the lease expires. In addition to the obvious but not insurmountable concern this arrangement would pose for full U.S. control of its SPR and the physical damage that repeated oil releases could cause to SPR facilities, CBO does not see the necessity of physically returning oil. If oil producers see potential profits in leasing oil, those profits could be achieved by taking possession of any comparable quality (or appropriately discounted) oil that the United States could acquire on open markets and deliver under terms of the lease. In any case, the option to release SPR oil into the market at any time should rest exclusively with the United States.

Regarding the applicability of other laws and regulations, CBO sees no compelling reason why the government should exempt itself from legal or policy restrictions unless major cost concessions result. Cargo preferences, environmental impact statements, normal contractual procedures, and import duties and charges are

all well-intentioned programs with clear policy objectives. For example, legislative requirements for granting cargo preference to U.S. flag vessels for shipping SPR oil are based on national security concerns (maintaining a viable merchant fleet), safety and environmental concerns, and a desire to benefit U.S. shipping. Before any significant volume of oil imports is excused from the 50 percent U.S. flag shipping requirement (mandated by the Cargo Preference Act), careful consideration should be given to whether the cost advantages would outweigh the consequences for national security and safety.

CBO has not studied the advantages and disadvantages of exempting lessors of oil from federal or local taxes. Tax exemption can be a powerful tool for channeling investments and would probably ensure some cost concessions from oil producers. But these concessions might not offset the loss of federal revenues, which would then increase the deficit. In addition, it is difficult to see how a change in tax laws could discriminate between national and private oil companies in this area--exempting only oil-producing countries--without encouraging creative maneuvers for subverting its intent.

## CONCLUSIONS

CBO does not find any significant difference between the basic cost-benefit methodology used by DOE and that used in other recent studies with respect to its conclusion that the SPR should be filled only to 750 million barrels. DOE's recommendation that the SPR not be expanded to 1 billion barrels rests on several key assumptions as to the likelihood of large supply disruptions, the amount of offsetting supplies available from unaffected sources during a disruption, and the demand for oil during a supply emergency. This memorandum has described alternative assumptions that demonstrate how critically the recommendation for expanding the SPR depends on DOE's assessment in those areas.

Given any particular goal for oil stocks, the federal government should acquire oil for the reserve in the most economically efficient manner. As DOE suggests, leasing oil directly from another country could result in real economic savings under certain favorable assumptions. Therefore, it does not seem warranted to discourage attempts to acquire strategic reserves of oil by leasing. CBO believes that the budgetary treatment of any lease should reflect the true federal costs of oil. If obtaining oil through a leasing arrangement that provides real economic savings to the government proves possible without hampering the ability of the President to respond to energy emergencies, that option should be undertaken. A proper system of budgetary accounting would recognize such savings. Similarly, if oil leasing ultimately costs more than direct purchases of oil, the budget should reflect such cost.

The CHAIRMAN. Gentlemen, with your forbearance, Senator Inouye has arrived, I believe. Senator Inouye is here, and we will allow him at this time to proceed. We are always pleased to have the distinguished Senator from Hawaii at our committee.

Danny, thank you.

## STATEMENT OF HON. DANIEL K. INOUYE, U.S. SENATOR FROM HAWAII

Senator INOUYE. Mr. Chairman, and members of the committee, I am most grateful to you for the special consideration. I am pleased to appear before you this afternoon to testify in favor of S. 2088.

This measure will expand our Strategic Petroleum Reserves to 1 billion barrels and establish a supplemental oil reserve. It will also reduce the dangers of supply disruption and strengthen our nation. This bill also offers a cost effective way of addressing storage problem by authorizing the Secretary of Energy to contract for storage and private facilities.

Having said that, however, Mr. Chairman, may I respectfully request your consideration of an amendment to locate a small portion of the supplemental oil reserve in Hawaii.

I am certain all of us are aware that Hawaii's particular vulnerability to energy supply interruptions has greatly troubled the state government. Senator Mutsunaga and I have placed an extremely high priority on obtaining this measure of protection. And so I appear this afternoon to join him in urging your consideration of Hawaii's supplementary oil reserve concern.

We are uniquely vulnerable because of our insular location, remoteness from petroleum products and supplies and lack of indigenous fossil fuel resources. And so any energy supply disruption will curtail transportation to and from the islands devastating our economy. As we know, we are 2,500 miles from the continental United States. And so we depend upon air transport not only for passenger travel but as well as for shipment of food and other supplies.

Furthermore, the mission of our military forces in Hawaii will be compromised by inadequate petroleum stocks. In addition, Mr. Chairman, I believe we have a unique responsibility to assist American territories throughout the Pacific. The Federal Government's obligation to the security of the nation extends to the Pacific not only to Hawaii but for our territories and possessions as well.

And so a commitment to the Pacific in the form of oil supply storage in Hawaii would be welcome by all U.S. flag territories and commonwealths in the Pacific Basin. And with sufficient reserves Hawaii could meet their strategic needs.

All the other 49 states have access to oil transported by pipeline, rail or highway. However in Hawaii all of our oil and refined products arrive by ocean tanker. And this relies on tanker deliveries and makes Hawaii exceptionally vulnerable to the cutoff of oil supplies.

The Department of Energy's past assurances that sufficient tank capacity exists and that shipments can be timely dispatched to Hawaii in an emergency are hardly equal to the security of a reserve storage facility.

Since budget constraints have impeded realization of our regional petroleum reserve goal, this bill proposes to establish a supplementary oil reserve. It authorizes the secretary to contract for storage of petroleum owned by others. Such storage may be in private facilities, and this proposal is a cost-effective way of addressing the problem in the interim.

We in the State of Hawaii are anxious to work with the Federal Government and contribute towards the establishment of a storage facility through one of the several alternative financing methods designed to create additional storage. And I am encouraged by the possibility of leasing oil in related facilities as outlined in the bill should Hawaii be deemed an appropriate cite for storage.

And so I support this measure and urge that at least 10 million barrels of the supplemental oil reserve be located in Hawaii.

And I thank you very much, Mr. Chairman, for this opportunity to testify on a matter of great concern to Senator Matsunaga and me. And we look forward to working with you, sir.

[The prepared statement of Senator Inouye follows:]

STATEMENT BY U.S. SENATOR DANIEL K. INOUYE
BEFORE THE SENATE ENERGY & NATURAL RESOURCES COMMITTEE
IN CONSIDERATION OF S. 2088, "THE ENERGY POLICY AND
CONSERVATION ACT AMENDMENTS OF 1990"

Dirksen Senate Office Building, Room 366
Tuesday, March 20, 1990--2:00 p.m.

Mr. Chairman, Members of the Energy and Natural Resources Committee, I am pleased to appear before you to testify in favor of S. 2088. This bill would expand our strategic petroleum reserve to one billion barrels and establish a supplementary oil reserve. The bill will thus reduce the dangers of supply disruption and strengthen our Nation. S. 2088 also offers a cost effective way of addressing storage problems by authorizing the Secretary of Energy to contract for storage in private facilities. In accordance with this bill, I respectfully request your consideration of an amendment to locate a small portion of the supplementary oil reserve in Hawaii.

Hawaii's particular vulnerabilty to energy supply interruptions has greatly troubled the State government. Senator Matsunaga and I have placed an extremely high priority on obtaining this measure of protection. I appear this morning to join him in urging your consideration of Hawaii's supplementary oil reserve concern.

Hawaii is uniquely vulnerable because of its insular location, remoteness from petroleum supplies, and lack of indigenous fossil fuel resources. An energy supply disruption will curtail transportation to and from the islands, devastating the entire state economy. Hawaii is 2500 miles from the continental United States. Accordingly, the State depends on air transport for passenger travel as well as for shipment of food and other supplies.

Furthermore, the mission of our military forces in Hawaii will be compromised by inadequate petroleum stocks. In addition, we have a general and moral responsibilty to assist American territories throughout the Pacific. The federal government's obligation to the security of the nation extends to the Pacific, not only for Hawaii but for our territories and possessions as well. A commitment to the Pacific, in the form of oil supply storage in Hawaii, would be welcomed by all U.S. Flag territories and commonwealths in the Pacific Basin. With sufficient reserves, Hawaii could help meet their strategic needs.

All the other 49 states have access to oil transported by pipeline, rail, or highway. However, in Hawaii all of our oil and refined products arrive by ocean tanker. Our reliance on tanker deliveries makes Hawaii exceptionally vulnerable to a cutoff of oil supplies. The U.S. Department of Energy's past assurances that sufficient tanker capacity

exists and that shipments can be timely dispatched to Hawaii in an emergency are hardly equal to the security of a reserve storage facility.

Since budget constraints have impeded realization of our regional petroleum reserve goal, S. 2088 proposes to establish a supplementary oil reserve. It authorizes the Secretary of Energy to contract for storage of petroleum (crude oil and petroleum products) owned by others. Such storage may be in private facilities. This proposal is a cost-effective way of addressing the problem in the interim. The State of Hawaii is anxious to work with the federal government and contribute towards the establishment of a storage facility through one of several alternative financing methods designed to create additional storage. I am encouraged by the possibility of leasing oil and related facilities as outlined in S. 2088, should Hawaii be deemed an appropriate site for storage.

I support S. 2088 and urge that at least 10 million barrels of the supplementary oil reserve be located in Hawaii.

Thank you for the opportunity to testify on a matter of deep concern to Senator Matsunaga and me. We look forward to working with this Committee on S. 2088.

The CHAIRMAN. Thank you very much, Senator Inouye. We appreciate your testimony and especially your support for the bill.

Is there only one refinery in Hawaii?

Senator INOUYE. Yes, sir.

The CHAIRMAN. And you would want the reserve to be crude oil?

Senator INOUYE. Yes, sir.

The CHAIRMAN. And not refined product.

Senator INOUYE. Yes, sir.

The CHAIRMAN. Questions for Senator Inouye?

Senator MCCLURE. No, I have none.

The CHAIRMAN. Thank you very much, Senator Inouye. We appreciate your testimony.

Senator INOUYE. I thank you.

The CHAIRMAN. Next, we will have the distinguished CEO and chairman of Louisiana Land and Exploration to testify. And by the way thank you very much, Leighton, for your charts which I used in my wetland speech yesterday.

Mr. STEWARD. Good.

The CHAIRMAN. And quoted your solution but said that it was not my own, and that if they liked it they could give me credit, otherwise to blame LL&E. [Laughter.]

Mr. STEWARD. Thank you, we will be happy to defend that one.

## STATEMENT OF H. LEIGHTON STEWARD, CHAIRMAN, PRESIDENT AND CHIEF EXECUTIVE OFFICER, THE LOUISIANA LAND & EXPLORATION CO., ACCOMPANIED BY JOHN LYLES, TREASURER, VICE PRESIDENT OF PLANNING

Mr. STEWARD. Thank you, Mr. Chairman, members of the committee. I am Leighton Steward, chairman and CEO of the Louisiana Land and Exploration Company. And with me today is John Lyles, who is our vice president of planning and also treasurer of our company. I have submitted a written statement. I also would like to make some summary remarks.

I appreciate the opportunity to be here today, because I am utterly convinced that we are at a unique point in the evolution of world energy markets. And with the historic window of opportunity before us to influence the nature of energy markets in the future, our current energy policy seems to be: produce what we can at prevailing world prices, import our remaining requirements and then, maintain a Strategic Petroleum Reserve in case the import stream gets interrupted. And it seems about that simple.

It is therefore crucial that the Strategic Petroleum Reserve be adequate in size as well as effective in utilization. Now the role of SPR is twofold: to deter a boycott and to facilitate the actual management of a disruption.

Clearly, these roles are part physical but also part psychological. We should not assume that it is possible to predict the length of a serious disruption. Hence, policies must be followed that will prevent the Strategic Petroleum Reserve from being exhausted.

The overriding need to reassure our population and industry will encourage early and significant use of the SPR and comments in the DOD size study support this. Now reconciling early in significant use with the practical constraint of not exhausting the SPR

while the disruption is still under way, leads to the simple conclusion that there is a difference between the usable volume in the psychological sense in the actual physical size of the SPR.

To be effective the SPR must be larger than calculated by purely arithmetic analysis. There must be a margin. Now history shows that price spikes occur with most disruptions—even the one tanker Valdez disruption.

A severe disruption can persist for some time like the 1973 and 1979 disruptions. And they persisted even if the price was not justified by long term fundamentals. Thus, some of these price spikes that we have seen have actually become steps in the price of oil in the world.

Large strategic stocks discourage psychological panic. Our reserve is less than a 75 day supply and, it is continuing to fall. To examine the Strategic Petroleum Reserve's influence on disruption prices via this purely mathematical model will tend to understate its true value.

I believe the reason the SPR size study assumptions are generally too optimistic: A, regarding the availability of significant amounts of instant surplus production capacity; B, the utilization of foreign stocks; C, likely consumer responses; D, the working of the energy markets and E, just general inadequate consideration of the psychological factors that take over during a disruption.

Now although the major Iran/Iraq conflict did not significantly affect the energy markets, it came during a major OPEC production over capacity. OPEC had dropped from furnishing 30 million barrels a day down to furnishing about 16 million barrels a day, and there was a tremendous amount of oversupply. But now that the supply is tightening the ground rules are being altered. We are now more like the 1970s.

If you believe a disruption would be a major event, I believe you will conclude that expansion of the SPR is justified.

As owner of several salt domes, LL&E was asked to testify last May before this Senate Energy and Natural Resource Committee. The committee asked that I testify on the feasibility of a private company furnishing storage space for the SPR.

I advocated privatization on the grounds of cost efficiencies. But while I was here, I also volunteered a better way for the government to acquire the oil for the SPR. I suggested that the government lease or option the oil from a foreign producer with excess production capacity and long-lived reserves. And that the producer might do it for a very reasonable fee.

Mr. Chairman, you and Senator McClure encouraged me to pursue the idea with the producers. I did. I met with several OPEC ministers. I also met with some administration officials, the IEA and also Japan. I would like to share my conclusions from those many contacts. Major producers are interested in discussing a leasing arrangement. And some of the producers are truly interested in assisting us to build a large Strategic Petroleum Reserve. They want the U.S. comfortable with future energy supply.

I was gratified that our leasing proposal was endorsed in Admiral Watkins' cover letter to the DOE size study report. I believe that leasing has the potential to save 50 percent or more versus regular purchases. But I was surprised DOE's cost benefit analysis

did not consider leasing or the money that could be saved by leasing.

On the leasing I would like to stress this leasing concept is not like a conventional lease. It is not debt-driven. Producers have little cost basis in their oil if they have a 100 year reserve life. So unlike a conventional life, there is little cost basis to recover.

To very briefly review the essentials of the leasing concept, the foreign producer with excess capacity and long-lived reserves leases his valueless oil at below commercial rates, say 5 percent of today's value at $20 or about $1 a barrel.

Now why should he do it? It is income he would not otherwise have. It would not count against his quota. He cannot sell additional oil today with driving the prices down. And it also is a strategic revenue hedge for that country in case his own supplies get shut down for whatever reason.

Now the advantages to the U.S.: it reduces our acquisition cost by 50 percent or more; we should be able to budget it like any firm would budget an insurance premium annually. We do not think it makes any sense to kill a good deal just because of a budgeting procedure. It could allow faster fill rate. And it would prevent the producer from wanting to participate in a boycott.

We are at a unique point in the evolution of world energy markets. Energy demand is strong. The Eastern Bloc disorganization, and then the growth that will come after that will help increase this demand. The marginal barrels belong to OPEC. And their surplus production capacity is declining. They must spend $60 billion to increase production by 5 million barrels a day by 1995.

The infrastructure to move the oil is becoming strained; $100 billion is going to be spent on tankers. And the producers today are stressing cooperation and stable markets. I believe this historic alignment of interest between consumers and producers presents this window of opportunity. It is fortuitous; it occurs at a time of cooperation that is sweeping the world. But as the supply and demand curves begin to converge, there is going to be a negative incentive to lease a barrel for $1, when the same producer can sell it for $20.

So in conclusion, I believe an SPR of adequate size can contribute immeasurably to ensuring the future stability of energy markets. You can soon support legislation to increase the size of the SPR and to authorize an alternate method of financing the oil and also the facilities.

An early, strong, unified approach by Congress and the administration will ensure continued interest in the oil producing countries. The lack of unity will act as a deterrent. Now is time for action, and I urge your support for these proposals.

Thank you.

[The prepared statement of Mr. Steward follows:]

STATEMENT OF

H. LEIGHTON STEWARD

CHAIRMAN, PRESIDENT AND CHIEF EXECUTIVE OFFICER

THE LOUISIANA LAND AND EXPLORATION COMPANY

TO THE

SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES

MARCH 20, 1990

Mr. Chairman and members of the Committee: My name is Leighton Steward. I am Chairman, President, and Chief Executive Officer of The Louisiana Land and Exploration Company. It is my pleasure to appear before you today regarding the proposed legislation, S.2088, the Energy and Policy Conservation Act Amendments of 1990, and more specifically to submit testimony supporting the need to expand the Strategic Petroleum Reserve to at least a billion barrels, the advantages of acquiring crude oil to fill the reserve, by leasing, and briefly to discuss the advantages of leasing storage for the increment after 750 million barrels. I commend you, Mr. Chairman, for conducting hearings on this vital subject.

I am utterly convinced that we are at a unique point in the evolution of World Energy Markets with an historic window of opportunity to influence the nature of energy markets in the future.

Our current energy policy seems to be: to produce domestically what we can at prevailing world prices, import our remaining requirements, and maintain a Strategic Petroleum Reserve. It is, therefore, crucial that the SPR be adequate in volume as well as utilized effectively.

The role of the SPR is twofold: to deter a boycott and facilitate the actual management of a supply disruption. Clearly these roles are part physical and part psychological.

We should <u>not</u> assume in general that it will be possible to predict the length of a serious disruption. Hence policies must be followed that will prevent the SPR from being exhausted.

The overriding need to reassure our population and industry will encourage early and significant use of the SPR. This view is amply supported by comments in the Congressionally mandated DOE size study. Reconciling early and significant use with the practical constraint that no one is likely to follow policies which will exhaust the SPR while a disruption is still underway, leads

to the simple conclusion that there is a difference between the usable volume (in the psychological sense) and the actual physical size of the SPR. To be effective, the SPR must be larger than that calculated as justified by a purely economic analysis. There must be a margin!

History has shown that price spikes occur with most disruptions, even the Exxon Valdez single tanker incident which was a 17 hour U.S. supply disruption, drove up gasoline prices 40¢ a gallon in California. A severe disruption can persist for a considerable period (perhaps years), even if this price is not justified by long-term fundamentals; a disruption induced "spike" thus becomes a "step." Large strategic oil stocks discourage the psychological panic that can accompany a disruption. Our reserve today covers less than 75 days supply at current consumption levels and will fall much lower as imports continue to increase.

To examine via purely mathematical models, the SPR's influence on disruption prices will tend to significantly understate its true value.

I believe further expansion of the SPR to at least one billion bbls. is well justified.

I believe the recent SPR size study assumptions were simply too optimistic:

a) regarding the availability of significant amounts of instant surplus production capacity,
b) the utilization of foreign stocks,
c) likely consumer responses,
d) the working of energy markets, and
f) failed to adequately consider psychological factors in their analytical efforts.

We know that one major event, the Iran-Iraq conflict in the 80's did not exert a significant impact on energy markets because of the availability of substantial surplus production capacity (OPEC production had declined from 30MM B/D to 16MM B/D). Supply is now rapidly tightening (OPEC will soon be producing 26MM B/D)

and this will significantly alter the ground rules. If you believe market conditions will make any disruption a serious event like the two we experienced in the 70's and you apply reasonable assumptions, I believe you will conclude expansion is justified even using the DOE's most recent methodology.

LL&E became involved in SPR deliberations as the owner of several salt domes, well located for receiving oil from America's only offshore large super tanker terminal (LOOP) and having the potential for pipeline interconnections to 1/3 of the U.S. refining capacity. In previous testimony before this Committee last May, I was requested to comment on the feasibility of private industry furnishing storage for the SPR. I advocated the privatization of incremental SPR storage on cost efficiency grounds and also volunteered what I thought was a better way for our government to obtain oil for the reserve. I suggested that major foreign producers with excess production capacity and long-lived reserves might be prepared to lease or option oil from future incremental production. In that hearing, Mr. Chairman, you and Senator McClure encouraged me to pursue the idea of oil leasing and see if any producers might be interested. I did so, and have met with several OPEC Ministers, numerous Administration officials, the IEA, and also Japanese officials.

I want to share my conclusions from these many contacts with you today.

1) Major producers are interested in furnishing barrels to the SPR in an inexpensive leasing arrangement, and
2) Some members of OPEC appear truly interested in assisting us in building a reserve of significant size.

I was gratified that the leasing concept, which I proposed in my testimony to the Senate, was endorsed in Admiral Watkin's cover letter to Congress that accompanied DOE's recent SPR study. The size study economics assumed only conventional purchases of additional volumes. I believe leasing oil from a major producer has the potential for a dramatic reduction in costs that could be

50% or more. The cost/benefit analysis by the Department did not consider this.

I want to particularly stress that this concept has little in common with garden variety financial leases (such as for trucks and cars). Unlike most leases, this one is not debt driven; the producer has little cost basis in his oil.

Let me review the elements of the oil leasing concept.

The world's reserves are concentrated with a few large producers whose reserves will last over 100 years at current rates of production. Any marginal oil which could be produced today has very low current value to a foreign producer (since it will, in effect, not be produced for many years). This circumstance creates a substantial economic incentive for such a producer to use marginal capacity to lease oil to the U.S. SPR at below commercial market interest rates.

For example, one of the major foreign producers could lease oil to the U.S. in return for an annual fee of say 5% or less of today's market value (which at $20/B, conveniently works out to be $1/B/yr.), with a subsequent payment, when and if, the leased oil is actually used by the U.S.

Why should a producer lease oil to us at below market rates? It is additional income on otherwise "valueless" oil, it doesn't count against his quota, and they cannot sell additional volumes without negative market and quota consequences. It also can act as a potential revenue hedge in case of a force majeure disruption in the producer's own country.

The advantages to the U.S. are:

1. It has the potential to reduce the cost of acquiring oil by 50% or more;
2. It would be very attractive to simply budget the annual fee ($1 versus the $20/B acquisition cost), analogous to the way any firm treats an insurance premium,
3. It could facilitate a much faster SPR fill rate;
4. The lease arrangement gives producers financial

encouragement to assist in giving consumers a greater sense of energy security, and

5) It would be difficult for any producing nation to create or participate in a boycott with substantial barrels of oil stored in the U.S.

I want to reemphasize that we are at a unique point in the evolution of World Energy Markets.

1) Energy demand growth has strongly resumed and will eventually be accentuated by Eastern Block events and production problems in the Soviet Union & Mexico.
2) The marginal barrel is an OPEC barrel and surplus production capacity is rapidly diminishing. OPEC talks in terms of the necessity to spend tens of billions of dollars to provide capacity to meet 1995 demand.
3) The infrastructure necessary to move the oil is becoming constrained. Projected cost for tankers alone is skyrocketing and pending legislation will further increase these costs.
4) Major producers stress cooperation, stable price growth, and say they want to avoid a repetition of the boom/bust cycle of the 70's and 80's. I am convinced they are sincere, but this attitude may not survive tightening supplies and markets in the 90's.

I believe we have a unique window of opportunity as consumers and producers see historic alignment in their long-term interests. It is fortuitous that this occurs as a spirit of cooperation and shared destiny on so many matters seems to be sweeping the world. As the supply-demand curves converge however, there will be a negative incentive to lease oil at $1 per barrel if the foreign producer can sell the same barrel for $20 or better.

Mr. Chairman, let me comment briefly on the idea of private storage.

The private leasing of facilities as an alternative to government ownership is certainly feasible and may offer

significant advantages.

The primary advantage is that it should save the taxpayers money through the free enterprise process. By leasing the facilities, the government will save the high front-end capital investment, a significant advantage during a time of budget stringency. Instead of purchasing the actual facility, the government can rent the storage facility with low annual rent payments spread over the term of the storage. LL&E, which owns salt domes not presently being utilized, does not have to bear the capital cost of acquiring the domes and therefore can more economically prepare the facilities for storage of crude oil.

To enable private parties to finance, construct, and offer storage at attractive rates, it will be necessary for the government to enter into a fixed long-term (greater than five years) storage agreement. This, in fact, seems natural as the government would certainly wish the options to extend the storage period, in essence, indefinitely. The fixed obligation of the government to lease storage space for a reasonable period of time is an absolute requirement to enable private parties to spread the cost over a period of time.

In conclusion, I believe that the SPR, if of adequate size, can immeasurably contribute to insuring the future stability of energy markets. The concept of oil leasing can help accomplish expansion of the SPR in a far more cost-effective manner and more quickly. It would also contribute to, and encourage, a general climate of energy cooperation which would be of immense benefit to the world's future economic well-being.

Mr. Chairman, I believe the opportunity open to us today is truly unique and historic. You have introduced legislation that will increase the size of the SPR and authorize an alternative method of financing the SPR by leasing oil and facilities. As a concerned citizen and an oil and gas company executive, I commend you for that.

I believe the time for action is now.

Mr. Chairman, I will be pleased to answer any questions that you or other members of this committee may have.

The CHAIRMAN. Thank you very much, Mr. Steward.

Our final witness is Dr. Philip Verleger, Visiting Fellow, an oil economist at the Institute of International Economics.

## STATEMENT OF DR. PHILIP K. VERLEGER, JR., VISITING FELLOW, INSTITUTE OF INTERNATIONAL ECONOMICS

Dr. VERLEGER. Thank you, Senator.

I will be brief. I too was surprised when I read the DOE report and found that they concluded that 750 million barrels was enough. And that the cost of expanding to 1 billion barrels exceeded the benefits.

Indeed if you read the DOE report carefully, we probably ought to stop filling the SPR today because the benefits of going to 600 million barrels—just a little bit above where we are now from 600 to 750—seem not to be worth the benefits. And this year of budget stringency the money could be much better spent elsewhere.

However, upon close examination I have concluded that the results of the SPR study do not stand up. I will offer three reasons here and then I will offer a final comment on oil leasing.

The three reasons of problems with the SPR study are, first, that the agency has adopted, or the Interagency Working Group adopted what one might call an Alice in Wonderland view of the world oil market. In this world oil supplies could be cut by up to 12 million barrels per day without having any impact on the price of oil. That seems a little surprising.

Second, as part of that 12 million barrels a day there is an assumption that producing countries that are not affected by the loss in supply will sell at the predisruption price of oil—an assumption that is in conflict with past experience in the oil market, and is in conflict with past experience in almost every other commodity market, including soy beans, aluminum, copper.

Finally, I am troubled that the Interagency Group failed to address the impact of changing structures in the world oil market. As we all know over the last 10 years the oil market has been commoditized, which means that prices move much more quickly, as we witnessed this last April with the Valdez crisis and this last December with the increase in heating oil prices.

And that that effect means that prices move much more rapidly, probably staying up until the supply is restored—supply not just from stocks but from the production.

Let me start with point one on the DOE's assumption as to price. And I show on figure 1 of page 4 of my testimony a graph that depicts the price of oil that DOE expects to observe—not DOE, excuse me, the Interagency Working Group expected to observe for a shortages of up to 28 million barrels a day in 1995.

And you can see that up to about 13.5 million or 14 million barrels per day, there is no increase in price. Prices are maintained constant at $20.66 in 1988 prices. How do they get that?

Well, the answer is, that there are 6 million barrels a day of increased production from other OPEC countries that would not be affected. This is the offset surplus capacity. There is 2 million barrels a day of incremental production that comes from stock releases from other countries in Europe, Japan, Korea.

And then only if we are above 8 million barrels a day do we release oil from the SPR. Up to 12 million barrels a day oil from the Strategic Reserve can come from the 750 million barrels. It is only when you get above 12 million barrels per day that in fact we have to use that last increment, that last 250 million barrels.

Well, if we stack the deck this way, that is, we use the SPR last after everybody comes in first and after the other countries use their strategic stocks, it is not surprising, given the probability of distribution, that they find that the benefits of 250 million barrels incremental stocks are not worth the costs. Because the likelihood of a 12 million barrel per day disruption short of war is extremely small. Everybody would agree.

Even if you go back to the 1988 Oak Ridge study, if you put in—have to go to 12 million barrels per day, you do not get that situation. The trouble is the world does not work that way.

To avoid a price increase SPR oil probably has to be used first, not last. And one has to deal not just with the loss in production but also the speculative demand for oil that Dr. Reischauer described. Speculative demand that is—makes sense. It is not hording. It is perfectly rational on the part of all participants.

So that I would expect with full usage of the Strategic Petroleum Reserve, full usage of a 750 million barrel Strategic Reserve, we could hold prices at predisruption levels up to 2 million barrels a day of a disruption.

The CHAIRMAN. Let me see if I can get this straight, to interrupt you.

Dr. VERLEGER. That is all right.

The CHAIRMAN. The administration assumes that you could have a 12 million barrel a day shortage and not affect prices?

Dr. VERLEGER. This is how—this is what one works out when one goes through the DOE—or not the DOE—the Interagency model and examines in detail the computer output.

The CHAIRMAN. Do you recall what the shortage was at the time of the Iran oil crisis, like in 1979?

Dr. VERLEGER. Sir, I wrote a book on it and it was hard to find any. But I think that probably 1 million barrels a day——

The CHAIRMAN. Hard to find any, that is right.

Dr. VERLEGER. That is right.

The CHAIRMAN. And the price ran up how much?

Dr. VERLEGER. Three times.

The CHAIRMAN. And they are saying that you are just not going to get any response at 12 million barrels a day of shortage?

Dr. VERLEGER. The way the model is laid out, the way the analysis is laid out, you first use this offsetting production from other oil exporting countries. You then use the other 2 million barrels per day that comes out of the stocks held in other European countries. You use 350,000 barrels a day of natural gas substitution.

So up to 8 million barrels a day, the model is laid out, you have not used the SPR the way the model is put together.

The CHAIRMAN. Judge Ginsberg wrote this report? [Laughter.]

Dr. VERLEGER. There is no author on the detail.

Let me say, you have picked up the point that troubles me greatly. And I point out on page 6, an alt 7, an alternative graph that is

based on some work that is going on at the World Bank on the behavior of other commodity markets in crises.

This work by Agnus Deaton at Princeton and Professor Laroque from France has dealt with the probability of large increases in commodity prices. We have observed them in sugar, soy beans, copper over the past.

What one would expect to see, I think, is probably lesser increases per barrel of shortage than the DOE model allows for. But increases that start at 2.5 million barrels a day. And so that at something like 10 get us to $90 a barrel, not the DOE $20 a barrel.

The second—briefly—the second problem with the DOE model of the analysis by the Interagency Group is the assumption that in fact all oil exporting countries will increase productions by the 6 million barrels at $20.60. The analysis, it states, that the Persian Gulf countries right now wish to maintain stable price environments. That may be the case, that may change in the future.

The analysis assumes that Iran will be magnanimous if there is a shortage in rate production without pushing up prices. I find that troubling.

The third point in this really is the question of the overlooking the effect of energy commodity markets. As you know oil has become a commodity over the last 10 years, and many in the industry would like to avoid it. But, in fact, what has happened is that we now trade roughly 200 million to 250 million barrels per day in the world oil market, and prices respond instantaneously to psychological—to news as well as changes in supply and demand.

In that environment we have observed two very large increases in prices in the last year. The Exxon Valdez incident when we had about a two-week disruption in crude prices and gasoline prices were higher for three to four months.

We had much higher prices this last December due to the cold weather. Prices lingered at a much higher than normal levels for a full month afterwards. One would hope that really in an analysis like this some account of the commodity nature of the market and the quickness, the prices response to the market and also the potential failure of markets, such as the New York Mercantile Exchange would be taken into account. It was not.

So for those reasons, I have come to the conclusion that I would stick with the 1988 Oak Ridge study. I might go back to the methodology that was used in the 1988 Oak Ridge study and modify it for the more hair-triggered nature of the world energy markets today due to the commodity markets. But I certainly see no reason to switch away from the 1 billion barrel goal. I do not think 1 billion barrels is enough. I think we should go higher, particularly, given our increasing dependence on imported oil.

Lastly on oil leasing, let me just note that there is a long-standing history of commodity leasing. And that the commodity rate of interest, that is, that the rate of interest the owner of a commodity charges is frequently different than the rate that is charged on money. And that in some commodities it gets as low as 1 percent.

You cannot find out how low it is until you go to negotiate. In cases of platinum, it has been at 1 percent. Other cases with platinum, it has been as high as 8 percent, 9 percent, 10 percent or 15 percent.

Thank you, sir.

[The prepared statement of Dr. Verleger follows:]

# Expansion of The Strategic Petroleum Reserve To One Billion Barrels

Statement of
Philip K. Verleger, Jr.
Visiting Fellow
Institute for International Economics and
Senior Consultant, Charles River Associates

before

Committee on Energy and Natural Resources of the
United States Senate

March 20, 1990

Mr. Chairman, members of the committee, I am pleased to appear today to discuss the Strategic Petroleum Reserve. As you are well aware, the Department of Energy has recently issued two reports that have focussed on various aspects of the reserve. The first of these reports has examined alternative mechanisms for financing the strategic reserve while the second report has focussed on the question of the optimal size of the reserve. In my testimony today I will concentrate on the second of these two reports because it comes to a very surprising conclusion. Specifically, the authors of the interagency report on the size of the SPR conclude that the benefits that can be realized from the expansion of the reserve to one billion barrels do not justify the costs. I chose to focus exclusively on this report because its conclusion, if correct, makes discussion of alternative financing mechanisms unnecessary. Indeed, if the conclusions of the study are taken literally, the filling of the reserve should be stopped <u>today</u> because the nation is getting back roughly 50¢ for every dollar invested. In this era of budget stringency, such a return is unacceptable.

However, upon close examination, the results prepared by the Interagency Working Group on SPR Size in their report Strategic Petroleum Reserve, Analysis of Size Options appear to be seriously flawed in several important areas.

First, the members of the interagency working group appear to have an Alice in Wonderland view of the workings of the world oil market. In their fantasy, world supplies can be cut by a full twenty percent without having any impact on oil prices.

Second, the authors of the report have introduced a "Santa Claus" model of oil market disruptions in which oil exporting countries having surplus capacity immediately increase production to replace lost supplies at the predisruption price. These Santa Clauses are aided by other holders of stocks so that oil in the strategic reserve can be used last.

Third, the interagency working group has failed to address the impact that changes in the structure of world oil market will have on the market during the next crisis. These changes, which I will refer to as the "commoditization" of the oil market, require that consuming governments hold larger stocks and be ready to use them more rapidly.

The Interagency Working Group's Methodology

The study is based on a complicated comparison of costs and benefits. Costs and benefits of an expanded strategic reserve are computed by comparing the present discounted value of costs associated with a larger reserve to the benefits derived from the release of oil from a larger reserve in the event of a disruption. Costs are calculated by discounting projected future expenditures for building additional facilities and purchasing 250 million barrels of oil under three price scenarios and for three alternative fill rates. Real prices are projected to double between 1988 and 2020 under the low price case, rise by 150 percent in the mid price case and triple in the high price case. Costs are calculated

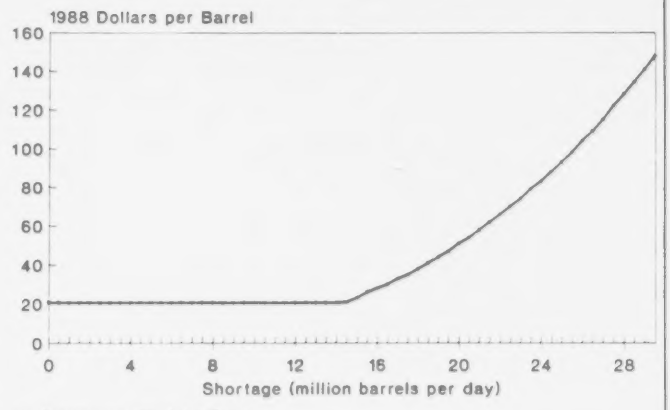
using these prices for fill rates of 50 mbd, 75 mbd and 100 mbd.

The economic benefits gained from a larger reserve are calculated by computing the macroeconomic losses associated with a disruption of a given size under two different drawdown schedules from the SPR. The benefits derived from a larger SPR are calculated by computing the price increase required to balance demand against the available supply given the higher drawdown from a one billion barrel reserve as compared to a smaller 750 million barrel reserve. A smaller loss is associated with the 1 billion barrel reserve because authorities are able to draw a greater volume of oil from the larger reserve, effectively holding down the increase in prices. These incremental economic benefits are then discounted by DOE's assessment of the probability of a disruption of a given magnitude in any year and by the discount rate.

Alice in Wonderland: The Oil Market in the Interagency Report

The Interagency Working Group's conclusion that the incremental benefits resulting from the expansion of the Strategic Reserve to one billion barrels are less than the costs is directly attributable to a flawed understanding of the behavior of the world oil market in a crisis. The Working Group actually assumes that a disruption of less than 8 million barrels a day in 1990 will have no impact on prices even if the US Strategic Reserve was not used. Further, the Working Group assumed that the world could tolerate a 12 million barrel per day disruption in 1995 if the Reserve were used. Unfortunately, these critical - and unbelievable - assumptions are buried in the report.

Figure 1
Interagency Assumptions: Relationship
Between Price Increases and Shortages




Source: Interagency Working Group
1995 mid range case

Figure 1 displays graphically the glaring weakness in the DOE report. It shows 1995 price levels associated with disruptions of various levels in the Interagency Group's mid range case. The Interagency Working Group started with an assumption that the price of oil will be $ 20.60/bbl in 1995 in the absence of a disruption ($ 27.25/bbl in current prices). Further, the Interagency Working Group assumed that the $ 20.60 price would remain in effect unless the world experienced a loss of production that exceeded 14.35 million barrels a day. In other words, a disruption that reduces supplies by less than 14 million barrels a day will have no impact on prices.

The authors of the study arrive at this revealing conclusion after examining the various "offsets" to the disruption. These

offsets include the use of excess capacity by OPEC nations (estimated to be 6 million barrels per day in 1995), drawdowns of foreign stocks (2 million barrels a day in 1995) and fuel switching (0.35 million barrels a day). Apparently, all of these offsets are assumed to occur before the first barrel of SPR oil is used. Further, all of the offsets are assumed to occur at $20.60/bbl.

It is not surprising that the Interagency Working Group concluded that the costs of expanding the Strategic Reserve to 1 billion barrels exceeded the benefits given these assumptions. If the Working Group is correct, the additional capacity of the larger reserve is only used in disruptions that are larger than 12.85 million barrels a day. The first 8.35 million barrels of replacement oil will come from surplus OPEC capacity, stock held in Europe and natural gas substitution. Then, an additional 4.5 million barrels a day of supplies could come from the 750 million barrel reserve. The added capacity of the billion barrel reserve is needed only if a shortage exceeded 12.85 million barrels per day. The incremental 250 million barrels in the billion barrel reserve would supply up to 1.5 million barrels of additional supply.

Under these assumptions it is entirely logical that the Interagency Working Group concluded that costs of expanding the SPR to one billion barrels exceed potential benefits. The likelihood that supplies will be cut by more than 12.85 million barrels a day, short of a major war, is essentially nil.

Unfortunately, the Working Group took an excursion to fantasyland when it assumed that prices would remain stable for

disruptions of less than 8 million barrels a day. Further, it was equally unrealistic when it ignored the impacts of hoarding. There is absolutely no evidence from any commodity market to justify either assumption.

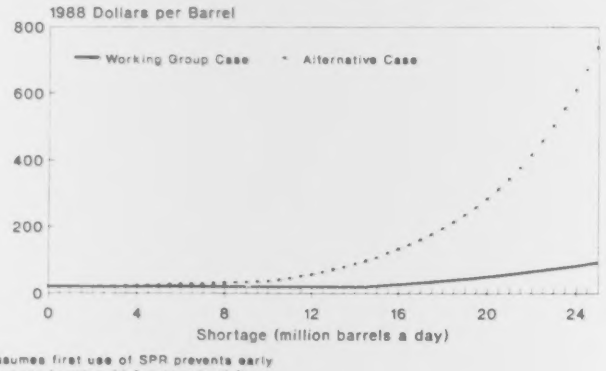
The assumption that prices will not increase can be supported only as long as the United States and other consuming governments can supply oil to the market in a volume that (a) fully offsets the loss in supply and (b) offsets any increased demand for stocks (hoarding). In actuality, this means that prices will increase unless the volume of oil released from the U.S. Strategic Reserve at least matches the loss in supply because governments of other consuming nations are not prepared to use their strategic stocks quickly.

Prices of crude oil will begin to increase with the loss of the first barrel of supply unless DOE steps in immediately to offset the loss. Even under the best of circumstances I would predict that prices will increase if the shortage exceeds 2.5 million barrels a day even if 4.5 million barrels a day of SPR oil is supplied to the market. The excess SPR output will go to build private stocks, a phenomenon that is quite natural and rational. Price increases could possibly be avoided for shortages as large as 4 million barrels a day if the United States were to build a one billion barrel reserve.

The behavior of prices will also be different than is assumed by the Interagency Working Group. Rates of increases should be lower than are assumed as long as other offsets are available while

rates of increase will probably be much larger than assumed in the once offsets are exhausted, at least if evidence from other markets is to believed. One possible pattern of increases is shown on Figure 2. This alternative case is based on preliminary analyses of the behavior of commodity markets under stress currently being conducted at the World Bank.

Figure 2
Comparison of Interagency Price Case
With a Commodity Market Type Case




Prices rise by 79 percent under a 10 million barrel per day disruption, from $ 20.60/bbl to $ 34.60/bbl in the alternative scenario shown in Figure 2, hardly a very large increase given the magnitude of the shortage. Under a 20 million barrel per day loss in supply prices are assumed to increase to $ 284/bbl as compared to $ 51/bbl in the DOE scenario.

The incremental economic benefits from a larger reserve increase if the Interagency Working Group's assumptions are

replaced by these assumptions for two reasons. First, the additional capacity is used to meet a greater percentage of interruptions. Second, the macro economic benefits of the larger reserve will be greater for very large disruptions.

However, the Working Group's methodology will still underestimate the incremental benefit of a one billion barrel reserve because no allowance is made for multiple use over a thirty year period. Such an oversight is unimportant if one accepts the assumption that the reserve can be used last. However, the incremental 250 million barrels become important if one accepts the premise that the reserve must be used first in a crisis.

The Interagency Working Group's Santa Claus Theory

The Working Group's study must also be criticized for assuming that the available surplus capacity in oil exporting countries will be fully utilized at predisruption prices in a crisis. According to the authors of the study,

> In response to the growing demand for Persian Gulf oil, Saudi Arabia, Kuwait, Iraq, the UAE, and, to a lesser extent, Iran are planning to increase their oil production capacities. The Arab producers want to position themselves to meet future oil demand increases and help limit any upward pressures on prices. Demand is expected to slightly outpace capacity additions during the decade, however, resulting in a modest erosion in surplus capacity to about 5 MMB/D by 2000. Nevertheless, such a surplus will continue to provide a cushion of spare capacity which could guard against a supply disruption and could help the Persian Gulf states keep oil prices from rising substantially. It should be noted that some undisrupted, unused productive capacity may be unavailable during a severe disruption.[1]

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[1] Interagency Working Group on SPR Size, Strategic Petroleum Reserve, analysis of Size Options. Washington D.C. 1990 (memo) pp V - 3.

This expectation of altruism on the part of oil exporting nations conflicts with prior experience. During the 1979 Iranian disruption both Kuwait and the Saudi Arabia acted to push up oil prices. Dominant exporters of other commodities such as coffee, copper and aluminum have often pushed prices up when supplies were tight. Further, smaller exporters of commodities have often announced and occasionally made very modest reductions in exports at opportune moments to push prices higher. It seems improbable that non Persian Gulf exporters such as Mexico, Algeria, Nigeria, Libya and the Soviet Union would resist such temptations. It seems especially unlikely that Iran would altruistically increase exports to the west to hold down prices if it suddenly had the opportunity to boost prices. In short, the Working Group's assumption that oil exporting countries would resist the temptation to boost prices in the absence of an external stimulus when given the opportunity seems far fetched.

Of course, the United States could provide such an external stimulus by quickly releasing oil from the strategic reserve. First use of SPR oil would probably prompt exporting nations with unused capacity to raise output to capture increased revenues. These exporting countries can be expected to try to capture some of the revenues that would otherwise go to the United States. Thus, U.S. sales may be matched by offsets from other countries, extending the size of the reserve. For this reason an assumption of modest price increases up to perhaps 10 million barrels a day - such as are shown on Figure 2 - seem reasonable. However, it must

be recalled that such a policy is implementable only if the United States has a very large Strategic Reserve.

The Impact of the Commoditization of Oil Markets

The Interagency Working Group also ignored the development of commodity market institutions in the oil market. This change has made the market much more vulnerable to shifts in psychology as well as minor changes in supply or demand. Two recent events have dramatically illustrated this phenomenon. First, last April consumers observed the largest one month increase in gasoline prices ever recorded in response to the very minor interruption in supply associated with the Exxon Valdez incident. Then, last December, heating oil prices almost doubled during a record breaking cold spell. In both cases the higher prices persisted long after the disruption passed and supplies were restored. The full effect on gasoline prices probably lasted until July or August while the effect on heating oil prices lasted for an additional month. (The impact on heating oil prices would have lasted longer had the eastern United States not experienced record warm temperatures in January 1990.)

These two episodes contain a lesson for energy planners. Prices should be expected to increase rapidly at the outset of a crisis, not remain at predisruption levels as predicted by the Working Group. Further, prices will remain high until the lost supply is restored. Evidence from other markets indicates that these increases will occur even if the level of supply is maintained at predisruption levels because expectations of buyers and

sellers are fundamentally changed by the event that triggers the crisis. For example, coffee prices increased by 500 percent between 1975 and 1977 even though there was relatively little change in the volume of coffee available to consumers.

Based on recent experience in oil as well as evidence from other markets it appears that DOE planners should anticipate a similar phenomenon in the oil market unless they are willing to adopt a policy to meet the psychological as opposed to physical effect of a crisis. This would require that the agency plan to use the Strategic Reserve first and agree to supply oil in sufficient volumes to offset both the loss of supply and the increased demand for stocks. In short, DOE must plan to flood the market with oil if it is going to prevent prices from increasing. Obviously, such a situation was not contemplated in the Interagency Working Group's study.

Conclusion

I would summarize my testimony by stating that the Interagency Working Group is fatally flawed. It is based on a set extraordinarily unrealistic assumptions that bear utterly no relationship to the real world. As a result the Working Group's conclusion that the incremental benefits of increasing the SPR from 750 million barrels to one billion barrels do not cover the incremental costs should be rejected. Further, Secretary Watkins' endorsement of the Working Group's rejection should be ignored.

I would conclude by noting that the methodology developed by the working group to assess costs and benefits of expanding the SPR

should be abandoned. I understand that DOE has proposed that the modeling framework developed for the Working Group to assess the costs and benefits of expanding the reserve be used by the Congress to examine alternative scenarios. In effect this would make the Working Group's model the framework for the debate. I believe reliance on the model would be a serious mistake given the unrealistic assumptions contained in the model.

Finally, I will note that I am very troubled by the approach followed in the report of the Interagency Working Group. Disruptions of the oil market represent the energy sector's most serious threat to worldwide economic growth. The potencial economic loss is large, as we all recognize. Despite this exposure, the Interagency Working Group elected to evaluate the problem using assumptions that every informed layman would instantly recognize were unrealistic. Thus, I am forced to conclude that the choice of assumptions was not the result of a serious review but rather a well conceived effort to cook the results.

The CHAIRMAN. Thank you very much, Dr. Verleger.

Mr. Gentile, Senator McClure and I have been here since the energy crisis came. As a matter of fact on this committee which used to be called the Interior Committee, we started hearings prior to the 1973 oil crunch. So we have seen it all happen.

One of the things we have seen happen year after year is that the Strategic Petroleum Reserve budget figure is cannibalized each and every year. That is starts off usually at a modest figure and ends up even more modest.

Now this year I think you have money to fill at 59,000 barrels a day. Is that correct?

Mr. GENTILE. No, I am sorry, this year we are filling at 39,000 barrel per day.

The CHAIRMAN. All right. How about fiscal year 1991?

Mr. GENTILE. Next year it is 59,000, yes.

The CHAIRMAN. OK, next year it is 59?

Mr. GENTILE. Yes.

The CHAIRMAN. Well, fiscal year 1990, where did it start?

Mr. GENTILE. I believe it started at 39,000. I think we are at 39,000.

The CHAIRMAN. Well, I mean what did the administration request?

Mr. GENTILE. For FY 1990, we originally requested 25,000 barrels per day from direct purchases plus 50,000 barrels per day assuming NPR divesture. Last summer, President Bush proposed 75,000 barrels per day in direct purchases. Congress originally provided 50,000, but then we had an outlay cap on I think due to Gramm-Rudman, and we are down to 39,000.

The CHAIRMAN. Now what do you think are the chances of 59,000 barrels a day surviving the budget process and actually coming out in the budget? You know, if you put it through the computer—I tell you if you put it through the computer the chances are zero. Because I can tell you that it is going to get cannibalized, and it always does. Because here is this tremendous pressure on the budget.

We are in the Interior Appropriations Subcommittee; we need another $10 million to do something that is a high priority to some senator. And here is this grab bag over here called SPR, and you reach in the grab bag, and you do another $10 million deal. And you do a series of those. And pretty soon, instead of having 50,000 or 59,000 barrels a day, you have got 39,000 or 31,000 or whatever the figure is. It happens every year.

That is the reason that Senator McClure and I put in an amendment and passed it a few years ago that put the Strategic Petroleum Reserve off budget. Because on the theory first that it is the only way to do it. And secondly that it is really not an expenditure to put it in SPR.

And because of that, we now have over 500 million barrels in SPR, and we would not otherwise have it. Unfortunately, Dave Stockman with the budgetary purity came along and said: oh, my gosh, we cannot have this off budget. It still affects the federal budget, the economy.

And so they put it on budget. And so Strategic Petroleum Reserve filling has gone down to where it is today, 39,000 barrels a

day. I mean at 59,000 barrels a day, you would be almost at the turn of the century before you got to 750 million.

And at probably something like 35—which is I guess where we will end up this year—it would take, what—it will be well into the next century before you get to 750 million. And by that time instead of being 90 days, you will have what—what would you say, Dr. Verleger? 40 days?

Mr. VERLEGER. 45.

The CHAIRMAN. Yes, 40 days, 45 days.

Now, you will admit that my analysis of that is probably pretty close to correct. Would you not?

Mr. GENTILE. I would think, Mr. Chairman, that you probably know that issue better than I do at this point. Yes, I would admit that.

The CHAIRMAN. I mean, if you really look at the history of this thing, that is the way it always goes. So we have got to find another way.

Now, I very much appreciate the fact that the administration is now willing to endorse leasing. I think leasing is the key here. And frankly if we can go to leasing, I think we can soon—whether this year or later years—increase that cap of 750 million.

Now let me ask you, your view is that the government ought to own the facilities as opposed to leasing the facilities?

Mr. GENTILE. Since we have taken the position that the 750 million barrel SPR is the adequate size we do have that capacity right now in our governmental facilities, so we do not need to lease facilities. That is what the capacity that we are currently building at Big Hill.

The CHAIRMAN. Well, it would seem to me that the cost to annual outlays, which is really the crunch that comes up in the budget system, that is really the crunch. It is not the overall 10 year, 20 year cost, but it is the annual outlays.

It seems to me that annual outlays on leasing the facilities as well as leasing the oil would be small enough that we could ensure that additional protection.

Why could we not go, if we are going to lease the facilities as well, why could we not go to more than 750 million barrels? I mean it looks to me—or to put it another way, do you really prefer to defend those assumptions of 12 million barrels a day not affecting the price?

Mr. GENTILE. Mr. Chairman, I can tell you that that was the work of the Interagency Group. And that was the recommendation of the President's Economic Policy Council and the President's decision.

The CHAIRMAN. Well, that is a pretty good answer for a new secretary. [Laughter.]

The CHAIRMAN. They are studying their conclusion. I mean it just really does not make sense. It just seems so clear to me. And in one sense it is a gimmick designed in effect to get it off budget.

In another sense, what we are doing is we are giving to the owners of that oil the right to speculate as to the cost. So that at the end of—I assume the lease would provide that during the lease if we seek to use that oil that we have to pay the going market rate.

Of course you could structure it another way and say that it would be based on the rate that you put it in plus the CPI or——

Mr. GENTILE. Or any combination.

The CHAIRMAN [continuing]. Or any combination. But it seems to me that we do not want to speculate in the price of the oil. We want the protection which that oil gives to us, to be able to have it in this country. Do we not? How should we do that in the terms of the lease should it say, that when we order it up, it ought to be at market price or at some other price?

Mr. GENTILE. Mr. Chairman, we believe that that would be a result of negotiation. The key here is to have the oil in this country and have it under our control.

The terms of that lease would depend upon who the lease was negotiated with, and what the terms of that lease were.

The CHAIRMAN. Well, now how do we get from here to there? I mean we think—we have been agitating for some time to get this leasing proposition started. When can we do that? How soon are you prepared to start?

Mr. GENTILE. I think, sir, that we are asking for the authority to explore leasing as one of the options. And with that authority we have then started to look at leasing as an option.

The CHAIRMAN. I mean if we get you your legislation, how quickly would it take you to make a deal, assuming that you got willing partners out there?

Mr. GENTILE. Mr. Chairman, we have had preliminary discussions with a series of countries both in the Persian Gulf and elsewhere and also in the private sector here in the states. So we have already explored a bit.

As soon as we would have that authority we would go out and begin that process and see what we could find in terms of a good deal.

The CHAIRMAN. Are you prepared to move with some dispatch on the subject?

Mr. GENTILE. Yes, we are, Mr. Chairman.

The CHAIRMAN. Is it fair to say that the administration fully endorses this idea of leasing?

Mr. GENTILE. Yes, it does, Mr. Chairman.

The CHAIRMAN. And will give it a high priority?

Mr. GENTILE. Yes, sir.

The CHAIRMAN. Well, I am very, very glad to hear that.

Dr. Verleger, with respect to this probability of disruption, Senator McClure and I were here with the first—when the first oil shock hit.

Do you know of anybody in the world who predicted that kind of shock?

Mr. VERLEGER. All I remember that Jim Akins predicted something in advance but did not predict the price impact at all. No, sir.

The CHAIRMAN. Well, everybody figured that we were getting a little short. I mean we were having hearings at that time.

Senator MCCLURE. Would the Senator yield?

The CHAIRMAN. Yes, certainly.

Senator MCCLURE. I thank the Senator for yielding.

I gave a speech in Dallas, Texas in the spring of 1973 in which I predicted that there would be some non-political—non-economic

result of an oil action. At that time I said do not be surprised if the price of oil goes above $5 a barrel.

And all the wise people in this country told me I obviously ought to go back to Idaho, because I did not understand anything about oil economics—just by way of knowing how much we knew at that time.

The CHAIRMAN. McClure is the only guy in the country who predicted it, and now he is leaving us. [Laughter.]

Senator MCCLURE. Before it happens again. [Laughter.]

The CHAIRMAN. Well, I can tell you that in terms of the suddenness and the amount, I do not recall anybody who predicted that. I do not recall anybody who predicted the second oil shock in the Iran war.

I mean that could not happen. And it certainly could not happen in view of no real shortage or maybe 1 percent or 2 percent, or whatever it really was. Nobody predicted the—what I would call—the price conservation dividend.

In fact, Scretaries used to come up here and say that the consumption of gasoline is inelastic. And they did that based upon the studies that showed when the price of gasoline went from $.30 to $.35 a gallon, there was no reduction in demand.

And, in fact, that was nonsense. So nobody predicted it, and when we got the big conservation dividend—thank goodness—everyone was surprised. Everyone was surprised when we got the gas bubble. Do you remember—we are still in the end results of the gas bubble.

Dr. VERLEGER. The sausage?

The CHAIRMAN. Whatever you want to call it. No one predicted that. I mean they were talking—we were still talking about—on deregulation 11—was it 1989 or 11/1988, whatever that date was, the one when we deregulated natural gas the first time. That there was going to be this huge price spike.

And about that time we were having this gas bubble, so the price went through the floor. Nobody predicted that. Nobody predicted the electricity surplus. If they had they would not have continued to build at 7 percent per year increase.

Now does this not tell us, Dr. Reischauer, the fact that almost always the experts have been wrong? That we ought to prepare for being wrong again? [Laughter.]

Dr. REISCHAUER. I hope you are turning to me in the role of a non-expert on this issue. Do not trust the experts.

Certainly the experts are going to be wrong. But the question is, whether making an educated guess based on careful modeling of past behavior is better than making just a random stab at the problem. And I think the fact nobody——

The CHAIRMAN. Well, the point is though, the point is models do not work in this.

Dr. REISCHAUER. The fact that nobody predicted the responses that we have seen in the past does not mean that we are not a wiser and a more cautious set of experts now than we were in 1973 or in 1979. And one would hope that our judgments have improved a bit.

Dr. VERLEGER. Senator Johnston, if I could——

The CHAIRMAN. Yes, Dr. Verleger.

Dr. VERLEGER. It seems to me you have posed a very interesting question. One, I think you need to distinguish between two effects. There were a number of studies that projected the response that gasoline consumption would go down. Gasoline demand being inelastic does not mean there is no response. Professor Houthakker and I authored one back in 1973 making the point that a big gasoline tax then would help.

Professor Houthakker did a major study on electricity demand that showed that the Seabrook reactor was not required, that demand was going to grow at 3 percent and not at 7 percent. He was right.

These longer term studies generally capture the trends properly. But I think what you are getting at—and I think it is an important point—is that commodity market behavior over the very short run is extremely unpredictable.

The CHAIRMAN. And subject to emotions.

Dr. VERLEGER. Subject to emotions, subject to random shocks. One market disruption in coffee in 1976–1977—you probably remember—coffee prices went from $.60 a pound to $3.60 a pound over a two-year period in response to a relatively small 15 percent loss of production in Brazil.

The Brazilians tried to buffer the increase. They had a large inventory, so they played the role of the Strategic Petroleum Reserve. No model would predict that. And none of our models are any good at predicting the very short term movements of the oil market or the stock market or any of these other markets, when they get shocked.

The CHAIRMAN. Well, is not equally important in this equation—we talk about disruption and national security—but is not equally important the economics of the security which this gives you. Because if you have got a big enough reserve you can hold that in order to lower the price?

And secondly, the effect on independence of foreign policy. I have been in the room with the Secretary of Energy of the United States—I will not say who it was—who said, that we cannot fill the Strategic Petroleum Reserve because the Saudis do not want us to. And the Saudis are producing more oil than they need to. And we need to in effect bend our foreign policy to their wishes, because of the favors they are doing us.

Now, they were in effect doing us favors at that time. But why do we let intentionally the foreign policy of this country, the freedom of action of this country get held hostage to some foreign country, because we will not pay just a few bucks to increase the size of our reserve?

I mean—you were there, I think, Senator McClure. And we have seen it happen. I mean we have seen this whole thing play out. And we ought to prevent that from happening again. And we can under this leasing arrangement for a very modest cost.

Anybody prepared to argue with that? [Laughter.]

Mr. STEWARD. I will argue for it.

Dr. REISCHAUER. Mr. Chairman, I would just like to point out that those kinds of considerations are included in the calculation. Because as Dr. Verleger pointed out, the costs of expanding the

SPR simply to 750 million barrels exceed the measured benefit by some billion dollars.

Moreover, the justification for that insurance premium, or one of the justifications, is foreign policy, energy independence, military security, and perhaps also the effect it might have in discouraging other nations from playing politics with disruptions.

Senator MCCLURE. Could I restate that just a little bit, Mr. Chairman?

The CHAIRMAN. Sure.

Senator MCCLURE. Because I do not mean to quarrel with your premise. I want to put it in a different way. The same analysis that says, do not expand beyond 750 million would tell you—750 million barrels would tell you do not expand beyond 580 million barrels.

Dr. REISCHAUER. Strictly on the basis of measurable costs and benefits, you are correct. And it is up to the judgment of our political leaders to say how much these nonmeasurable benefits are worth to the nation. Are they worth $1 billion, $2 billion? And, you know, none of us can really have a judgment on that.

Senator MCCLURE. So we are making a judgment.

Dr. REISCHAUER. Yes, absolutely.

Senator MCCLURE. But that is not the judgment based upon the economic modeling. And if that judgment is available to us to exercise for the next 100,000 or 120,000 barrels or 175,000 barrels, whatever the figure may be, then the same kind of judgment may be applied to that amount above 750 million barrels.

Dr. REISCHAUER. Correct.

Dr. VERLEGER. But I think that there is—my point was that there is a step beyond that that I think the Interagency Group has underestimated substantially the benefits. Because to use Professor Reischauer's assumption really, what the insurance is, is an insurance policy with an enormous deductible.

And the cost of that enormous deductible is free. That is, the other oil exporting countries will supply it at the same price. And other consuming countries that have gone about building their strategic stocks will draw them first.

I have been in the process of writing a book for the last two-and-a-half years on trying to reform emergency management. Because I think that the oil has to be drawn on the first day of a crisis, given the nature of these commodity markets.

And I will tell you having talked with Japanese officials, they are not planning on moving on the first day and neither are the German officials. As a matter of fact, we are going to be lucky to see them in the first month. So that we have to move first.

And so there is no deductible.

The CHAIRMAN. And is not a larger reserve, does not that give us more freedom to move early in one of these supply disruptions so as to—I mean, if we have a smaller reserve, then we have got to save it sort of for security purposes.

If we have a larger reserve, we can deal with that for the purpose of affecting the price. Can we not?

Dr. VERLEGER. That is certainly the common wisdom by the politicians and the political—and the policy-making people. When I was in the government that was the view back in the late 1970s that you have to use it carefully and slowly.

I am not sure whether that in fact if we got to a disruption now and prices went from $18 a barrel to $36 a barrel quickly, whether that policy would hold. Whether in fact DOE would—the President would not decide that maybe we better use it early to stop the escalation of prices.

The CHAIRMAN. You know there is another thing about this. And that is sort of the non-permanence of this decision. That is, if we expand this SPR and decide we have more in there than we need, we can sell off what we have. We have got over 500 million barrels right now that we own. We could always sell that and make a profit, if we decide we are wrong. It is not like a B-1 bomber that you buy and it is there, and you cannot sell it. You are stuck with it for good or for ill.

Senator MCCLURE. Sell it to the Soviet Union.

The CHAIRMAN. This is a fungible commodity. We might sell it to the Soviet Union, right.

Senator MCCLURE. They are good friends of ours. [Laughter.]

The CHAIRMAN. I mean I cannot understand why we do not do this. Let me ask one more question before I turn it over to Senator McClure.

Mr. Gentile, in making this analysis, the working group that you were not part of, what did they assume? Do you recall what they assumed the cost of leasing would be? Or does anyone know that?

Mr. GENTILE. It was a break even analysis from what I am being told. I would ask—if I could ask one of my staff to answer that question, they could probably give you a better answer, Mr. Chairman.

The CHAIRMAN. Yes. If you would come to the microphone.

Mr. BORGSTROM. Senator, are you talking about the SPR——

Senator MCCLURE. Would you identify yourself for the record, please.

Mr. BORGSTROM. Oh, sorry. Howard Borgstrom with the Strategic Petroleum Reserve. Senator, are you talking about the SPR financing study, or the SPR size study?

The CHAIRMAN. The financing study.

Mr. BORGSTROM. In the financing study, as Mr. Gentile said, what we did is a series of sensitivity analyses to try to find under what conditions leasing would have the equivalent economics to outright purchase.

And what we came up with were a fairly wide variety of answers based largely on the structure of the contract itself. And I think what Mr. Gentile said earlier is that it would depend on what decision-making authorities we, in effect, were acquiring from the lessor. That would determine how much we would be willing to pay for that particular instrument.

The CHAIRMAN. Well, let me ask the question in another way. I understand the drift of your answer. And really you could not say what you were willing to pay at this point, because you have got to negotiate and bargain for that. But I think it is fair to say, and let me ask this to Mr. Stewart—because I know you have been talking to the Saudis—thank you very much.

I understand you have been talking to the Saudis, Mr. Steward. Are they interested in leasing oil?

Mr. STEWARD. Yes, sir. I just met about three weeks ago with Minister Nazer and his key lieutenants. And I would say that they were very genuinely interested in discussing oil leasing.

I would also say that they were very—appeared very genuinely interested in a stable oil price for the future. I think that is one of the reasons that we have this opportunity to discuss leasing with them. I believe that they think that it is in the best interest of the world, really to have the consumers very comfortable with their supply of oil as their future energy commodity.

And I think they are willing to back that up by cooperating with somebody in a lease. I do not think this is something that could have happened years ago.

The CHAIRMAN. Now without knowing exactly what they are willing to charge for the lease, would not you guess that they would be willing to charge less, since they have these huge reserves. And since this would not apparently at least count against their OPEC quota, that they would be willing to charge less than, say the cost of an American——

Mr. STEWARD. The going rate on a normal lease. Yes, sir, I believe they would. I cannot speak for them, but I would like to stress one more time that for a country like Saudi Arabia with huge reserves and a tremendously long reserve life—and that is the key here.

They have over 100 years reserve life. They have excess capacity today. If they do not use that excess capacity today, while they can just turn the valve, then theoretically they do not produce those barrels for 100 years. And at any discount factor that oil is not worth much to them.

So unlike a conventional leasing arrangement where one would have to pay back the cost of building the apartment that you are going to lease to somebody, or buy the automobile or whatever, they really do not have any cost basis in this oil. They do not have something to have to amortize, like you would in a normal deal.

So they can give you a real low price, something below market interest rates, possibly far below market interest rates and still get some additional income for themselves and still give you a good deal at the same time. That is why this is such a win, win situation.

And it also accomplishes the satisfying of the largest consuming market in the world. It gives us some comfort in not worrying about where our future energy is going to come from, because it is going to give us a supply to fall back on in these unforeseen emergencies.

And I would agree with earlier comments, I do not think we can predict when these emergencies are going to come. We certainly—I do not believe there is anybody in the world back in August would have predicted what has happened in Eastern Europe. I do not think we would have thought we would have free elections in Nicaragua.

You know we have tremendous things happen in South Africa to the positive side. It is a—nobody has predicted——

The CHAIRMAN. While you are on the subject of unpredictability, the price of oil—the price of crude, I think at one time was up 35 percent in the last 12 months. I guess it is still up about that much.

I can tell you the State of Louisiana did not predict that oil prices would be where they are.

Did LL&E predict that they would up 35 percent?

Mr. STEWARD. No. Our budget was a little bit lower. Although oil prices are back at $19.45 today, or they were the last time I heard. But we generally tend to predict things just like they are today.

And we do not seem to lead the duck very well.

The CHAIRMAN. Senator McClure.

Senator MCCLURE. Thank you very much, Mr. Chairman.

When I said a moment ago that I made the speech in Dallas, Texas in 1973 predicting what would happen, I do not mean today to indicate any more than I did then to say that there would be a supply interruption at some time in the future not knowing when it would happen and also suggesting that the price volatility or the economic consequences of that interruption were unpredictable.

And I undershot the mark by a long ways. My only point is, that indeed while you can look at vulnerability, the vulnerability lays the ground work for a predicable event without knowing exactly what the event will be nor when. I think that is even more true today than it was in 1973 or any time since 1973, because our dependence upon imported oil has risen.

Therefore events outside of our control have greater impact upon what happens to us. But rather than being less vulnerable today than we were in 1973, in my judgment, we are more vulnerable than we were in 1973 or any time since then.

Now what event it would be, where it would occur, I have no idea, except to indicate that for the last half-century we have had a political event in the Middle East that caused a supply interruption at least once every decade, except for the last 10 years.

Now is this really the aberration, or is this the new rule that there will be none in that area to cause those problems?

Secondly, I want to ask a question because it is a prelude to a comment or an observation.

Mr. Secretary, what is it worth to this country to be able to hold the price of oil stable? Or perhaps to put it another way, what does a $5 rise in the cost of oil cost this country?

Mr. GENTILE. I am not sure I know the answer to that, Senator. I would be happy to try to provide that for you, but I do not know the answer to that question.

Senator MCCLURE. Well, a great many people have said—and I resisted the answer at the time they were saying it in the mid 1970s and again at the end of 1970s—that a high proportion of the economic difficulties of the world were because of the price rise of petroleum.

And certainly the world, and this nation is no exception to it, paid a great price for the economic disruption that did occur with rising prices and inflation rates and the economic recession that hit the world at the end of the 1970s.

Whatever the reason was, whatever the contribution was, I am convinced that the price rise of oil had something to do with the economic conditions in the world. Certainly we are paying a great price in this country, even yet, for the widespread economic dislocation in the oil producing areas of this country. And we have not finished paying that price.

So there is a value to us in being able to moderate the price rises. And I think without stating precisely, it is an immense value.

Dr. Reischauer, do you have any idea of what that might be?

Dr. REISCHAUER. No, but I think you are dead right. I mean, suppose I could tell you that the average price of oil was going to be $25 per barrel each year over the next 10 years. If within any year it fluctuated between $15 and $35 per barrel you would have terrible disruptions. Businesses and consumers would be unable to plan. And certainly that would impose costs on the economy.

Senator MCCLURE. Tremendous cost to our economy.

Now that kind of gets me back to the fact that in 1973 we were totally unprepared. We had no idea that anything like that could happen. And, Mr. Secretary, I would state that I think your statement underestimates both cause and effect, when I look at pages 2 and 3 of your statement in particular about what happened in 1973 and again in 1979.

Now we did get complacent in that period of time, because we adjusted to the price increase of 1973-1974 and our economy did pretty well.

When we ran into that very marginal change in the world supply in 1979 the price doubled or tripled immediately after that because of a very, very small change in the free world oil supply. We paid a very high price for that. We continue to pay some of that price.

When the tanker war broke out in the Gulf, I expected that there would be some volatility in the oil markets. And the oil market went up about $.50 a barrel for about two weeks and dropped back.

I suggest there were two reasons for that very small change in the price of oil on that event. One was the capability of the parties to actually disrupt the oil supply. It was probably discounted in the marketplace. People did not really believe they would be able to pull it off.

And secondly—and without being able to measure it at all—we also had a very large supply of oil in SPR. We had the capacity to take care of temporary supply disruptions if they were not too large. And everybody in the world knew that.

Now what was that worth to us in terms of the impact to the economy just by maintaining stability of oil prices in the market? That is almost impossible to calculate. But I believe it was there. I think it is still there.

Dr. Verleger.

Dr. VERLEGER. I was going to note that when the tanker war broke out, there was also an additional Strategic Petroleum Reserve that had been developed by the Saudi Arabians who had positioned a great deal of oil around—in consuming countries just to meet such an event.

And I believe that they made offers to sell the oil at the time, some of which were taken, some of which were not. But that essentially they demonstrated at that point in time, that they were prepared to try to buffer the price from going up, demonstrating your point, that in fact the oil was there, and sales were made to stop it.

Senator MCCLURE. And when that happens the economy cannot measure the value, because the cost was not paid as was paid earlier.

You know one of the penalties of being around for a long time is that you remember a lot of things that happened. Now that is both positive and negative, because it can at least give you a base mark from which you can judge what should happen. But it also presents the danger that maybe you are wedded to the past, instead of really capable of measuring what the present or the future may be.

But I am absolutely convinced that we are again just as complacent as we were in 1973 prior to the Yom Kipper War. And I am equally convinced that this country, the public is lulled into a false sense of security, when we pass 50 percent dependence upon imported oil for our consumption. And yet there is scarcely a ripple of reaction throughout this country.

Had that happened in the mid 1970s, we would be making massive changes in policy. And yet we are not making massive changes in policy. There is almost no comment.

I guess I should say if. It might be better coming from the Republican side of the aisle than from the Democrat side of the aisle—that every administration since the Carter administration has been up here bragging about what they did to provide security for this country by having a Strategic Petroleum Reserve, and it was always created over the objection of the Republican administration.

It is not the administration that created this reserve. It is in spite of the administration that the reserve has been created. And I suggest we may be in the same problem today looking very narrowly at the current fiscal problems of this country and measuring against that the budgetary impact of buying more oil and not looking at the consequences of not doing so.

Dr. Reischauer, you are right in making the statement, we all have learned something. And perhaps we are wiser today than we were before. But maybe one of that bit of wisdom that we ought to have acquired and applying now is, how little we know, and how inaccurate are our forecasts about what will happen, if indeed something happens.

In 1972, in 1973, in early 1973 you could not convince anyone that there was a danger of an oil shortage. That there was a danger of an interruption of supply. I know because I tried. And nobody would listen.

In 1979, we had again gotten complacent, and nobody was looking at the consequences of an interruption of oil supply. And yet we lost permanently about 1.5 million barrels a day of free world oil production out of a total capacity of about 55 million barrels of oil production and the price of oil almost tripled because of that disruption in the market.

It is a commodity market. It is an essential commodity. It is not just one that you can by discretion buy or not, use or not. It is not something that if it is convenient you buy it, and if it is inconvenient you do not.

It is something that is essential to a modern industrial society, and the world knows that. And the result is that immediately upon any perceived shortage, not real, perceived shortage people immediately start trying to buy more. And the shortage becomes greater against that current demand, and price goes wild.

Now that is a factor in a commodity market. That is something that is not written into the law by averages. And I am not sure that computer models really recognize that or factor it in.

And I have told the story so many times, I hesitate to do it again. But there was that one time in the mid 1970s to late 1970s, a series of news accounts indicating that there was going to be a shortage of toilet paper. And I remember being down at the Giant Food market on Lee Highway in Arlington, Virginia.

And there was a little old lady coming out of that store with a carton of toilet paper. Now she was really that archetypical little old lady in tennis shoes. Why she had enough toilet paper there, she could not have used it the rest of her life. But she was not going to be caught short. And she could afford to pay the price of guaranteeing sufficiency.

And that is what happens with an essential commodity. Now I will submit to you petroleum is just as essential as toilet paper. [Laughter.]

Senator McCLURE. Although not as close to most of us. [Laughter.]

But at least we are going to react when we perceive a shortage to make sure that we are not caught short. And the price in markets react to that reality even more than the long term analysis might indicate.

And so if I am going to err, I am going to err on the side of protecting our economy, protecting our security and protecting our foreign policy independence, all of which have been referred to time and time and time again.

And I hope we will continue to press forward to do what administrations have uniformly said do not do. Do not spend the money, and we have. I am glad we have. It has been worth every penny we have spent. I cannot put a value on it. But I know that we have not wasted the taxpayer's money in creating the reserve.

And I just as surely, I know, we will not waste our money if we go ahead and go to the 750 million barrel reserve target. I know we will not waste our money if we go to 1 billion barrels reserve.

How to do that, by way of leasing? Yes, I think there is a great opportunity to lower our costs if we were innovative enough to explore the possibilities and find ways that meet our needs.

And, Mr. Secretary, I think you said it well, if we get it within our territory and subject to our control, that is all we need. We do not have to own it. We do not even have to own the entire escalation of value. But we do have to have it within our country. We have to have it subject to our control, if it is going to contribute to our security.

And again, I would say, Mr. Secretary, I think your statement on page 2 and 3 either mixes apples and oranges, overlooks short term effects. For example, in the middle of page 3 you point to the "reduction of world oil supplies at the time of the Arab oil embargo in 1973–1974."

That oil embargo was not aimed at the world. It was aimed at the United States and the Netherlands. And that is all. So, of course, world oil supply did not suffer. But the United States sure did.

The same thing can happen again in a variety of different scenarios none of which we could accurately predict. But I think we are being very, very short-sighted and very, very foolish, if we do not look at the consequences of the failure to have an adequate supply.

I appreciate your testimony. I look forward to working with this committee and the members of it to come up with a policy that I hope the administration can support even if reluctantly.

Thank you.

Senator BRADLEY. Senator McClure, thank you.

Let me ask all of you, I take it that the issue of the Strategic Reserve from the standpoint of security has been the issue that you have primarily addressed today.

What I would like to have you address is how you see the Strategic Reserve could be used to retard price increases? And how you best think that could be done.

We have argued for a long time on the committee as Senator McClure stated that you need a hedge against an insecure source of foreign oil.

And that is clearly where we are dependent now. But we also have worked around the edges of talking about the use of the Strategic Reserve in something less than a calamitous circumstance—a circumstance where you might have a big price increase and the temptation would be to slap on price controls. And the alternative would be to get the oil out of the reserve into the market quick enough so that you would have a moderating impact upon the price rise.

And I wondered if any of you have given any thought to that? Dr. Verleger?

Dr. VERLEGER. Thank you, Senator.

Over the last two years I have been looking at the change in the structure of the world oil market and really the role of the Strategic Petroleum Reserve in the context of this new structure.

It is my conclusion right now that the Strategic Petroleum Reserve would be of almost no use in retarding price increases for the following reasons.

Over the last 10 years we have seen a substantial change in the way oil is priced. When the reserve was created most oil moved to the United States under official contracts, under official OPEC selling prices.

If you look at DOE data on the distribution of price arrivals 95 percent of the oil was moving at an official price. The Saudis had an official price, Nigerians and so on. By contrast today almost all the oil moves on a market related price.

A cargo of Saudi Arabian oil that is brought to Exxon;s Baytown refinery will be priced about the time the oil arrives at the refinery. The contract specifies that the price of oil is tied to today to Alaskan North Slope crude less some adjustment. The price is fixed 45 days after the oil leaves Saudi Arabia. So that gets you really almost to the gulf or to loop.

That means that if you have a crisis, instead of having a 45 day leeway the way we did in the 1970s, where while the oil is on the water that oil is not going to affect our prices, the refiner's cost move today.

That means that the product prices at the pump have to move today, as we saw this last April in California and again in December. It is ironic that the two largest price increases we have ever seen in terms of the CPI and energy occurred in April 1989 and now in January 1990 from heating oil and from gasoline—not in the 1970s.

In that environment what you need is a policy that literally gets the oil out on the first day of the crisis. Now it has been argued by some that rational expectations on the part of participants in the market, just announcement of a sale, will slow the process.

And that may be so. But if you read the sale provisions that the DOE has right now, it takes 18 days or 20 days on the minimum most efficient time frame to conduct an auction. And I submit that commodity markets—or at least no commodity market that I have studied—has every managed to go 20 days without a serious problem.

Indeed, there was a very good article in last Friday's Financial Times on the problem the Chicago Board of Trade Clearing House had when Drexel-Burnham failed, because of trying to find ways to move the positions around.

We will have the same troubles—only worse—if we wait 18 days to 20 days.

So one, to answer question, yes, one could use it. And there are presumably price bans that—even today—the Department of Energy has. You do not want to see $30 oil in July 1990. That would be too much of an increase.

Two, changes are required in EPCA to really require a different method of auctioning the oil. What I have suggested is adopting the system used by the Federal Reserve Board: selection of a group of primary broker dealers, a creation of an auction process, where small volumes of oil can be auctioned literally in a one-hour period of time.

And so that volumes of oil are put into the market and having the psychological effect of reducing the speculative move once you see the price.

Senator BRADLEY. So that what you are saying is that, yes, it could be used to reduce price increases, but not in its present form because it takes too long to get out?

Dr. VERLEGER. Not under the current—it is not getting physical oil out. It is making the sale. You can take a month to make the sale. But you have to actually have—the buyer has to know that he has that oil today.

If Exxon knows it has the oil coming a month from now out of the Strategic Petroleum Reserve, it will—you know, you have the salutary effect.

Senator BRADLEY. Right. And the present procedures take 18 days?

Dr. VERLEGER. As I understand them the auction process is——

Senator BRADLEY. Is that right, Mr. Gentile?

Mr. GENTILE. Senator, what I am told is that it would take 18 days. But we would start the process before the actual drawdown decision. And therefore the time would be shorter. While the process would take about 18 days, we would start it earlier.

Senator BRADLEY. Well, let me ask you this. Work us through a day by day crisis. So the President has got to decide first, right?

Mr. GENTILE. Senator, could we supply that for the record, please? I quite honestly do not know the answer to that question.

[The information follows:]

## THE STRATEGIC PETROLEUM RESERVE OIL SALE PROCESS

The Strategic Petroleum Reserve (SPR) drawdown and distribution process involves a number of critical events, some of which can occur concurrently, and others of which must occur sequentially. This process and the associated events are described in terms of a sales and delivery cycle, consisting of a period for conducting a sale and another period for physically delivering the oil to the purchasers. The time periods associated with these activities were determined based on extensive written and oral dialogue with industry, including two Federal Register requests for industry comments.

The initial event in drawing down and distributing SPR oil is a direction to start the sales process. This starting point may be either the Presidential decision to draw down the SPR, or direction by the Secretary of Energy to start the sales process in anticipation of that decision. Under the latter procedure, SPR oil sales would be conducted on a contingent basis, with contracts awarded promptly after the Presidential drawdown decision.

The principal activities which immediately follow direction to begin the process are to place the SPR and its supporting commercial distribution facilities on the maximum drawdown readiness alert status and to issue a Notice of Sale. Such activities would include the administrative aspects associated with readying personnel, ceasing all non-drawdown related activities that could interfere with drawdown, verifying distribution capability, equipment checks, and verifying spare equipment and repair parts availability. These activities can be completed and drawdown of oil can occur within 15 days following the placement of the alert condition. Similarly, the commercial distribution terminals connected to the SPR sites are contractually required to be able to begin handling SPR oil within 15 days from the date the terminals are placed on alert.

Issuance of the Notice of Sale could take place within a day following placement of the SPR in a drawdown alert status. The Notice of Sale will be transmitted by the most expeditious means to prospective offerors who have already made themselves known, as well as to any other interested firm or individual who expresses interest. This Notice will announce the amount, type and location of the SPR oil to be sold, the delivery period, procedures for submitting offers, and the contract terms of the Standard Sales Provisions (SSPs) that are applicable to the sale. The SPR contains eight different crude oil streams, each having distinct quality characteristics; thus a Notice of Sale may offer up to eight crude streams and delivery locations. Each crude oil stream will have a number of alternative delivery modes, the number of modes being dependent on the capabilities of the commercial distribution terminals involved. Typically, each stream will be available for delivery by pipeline and by tank ship. Some streams, however, also may be made available for delivery by barge. The Notice of Sale will specify the total amount of the crude oil stream to be sold, the delivery period, the minimum purchase quantity, and total commercial terminal distribution capability. The Notice will not designate the transportation method by which the oil must be

delivered, the delivery date or the amount to be sold to any one particular buyer, as these aspects are determined by the bidding process.

The next event, following the receipt of the Notice of Sale by potential purchasers, is the preparation and submission of bids to the Department of Energy (DOE). Each bid must indicate price, the desired oil stream and purchase volume, the proposed transportation method and, for vessel deliveries, a specified 10-day period within the delivery month for receiving the oil. The bid may also indicate alternative acceptable transportation methods and periods. Offerors must also agree without exception to the terms of the Notice of Sale, as well as accompany their bids with financial guarantees equivalent to 5 percent of the bid value or $10 million, whichever is less. Typically, offerors will be given 7 days in which to submit their bids, which is considered the time period needed for offerors to prepare bids and submit them to the DOE.

Upon receipt of the bids from the offerors, the DOE will then evaluate these bids, which is expected to take up to 3 or 4 days. The oil contracts will be awarded to the offerors bidding the highest prices, and their choices of transportation method and delivery period will, within system limitations, determine how the oil will be distributed. There are, however, logistical constraints that may put a ceiling on the distribution of oil by one mode. Therefore, the DOE will not award contracts involving a particular delivery mode in excess of the estimated amount of oil that can be moved by that mode during the delivery period.

Upon completion of the bid evaluation, the DOE will notify the successful offerors, who must then make financial arrangements before being awarded contracts and taking delivery of the oil. At that point, responsibility for the process shifts to industry; that is, distribution becomes dependent on the speed with which the successful offerors can complete the necessary logistical arrangements.

The offerors' first responsibility, after being notified of their success, is for them, within no more than 5 business days, to arrange for and provide letters of credit or cash deposits as guarantees of ability to pay for the oil and perform under the terms of the contract. Upon receipt of an acceptable guarantee, which must be in an amount equal to 100 percent of the contract value, the DOE will award the sale contract.

While obtaining the necessary financial guarantees, the winning offerors also will begin making arrangements with the SPR and the transporting pipelines and/or vessels to take delivery of the oil. These arrangements are affected by U.S. laws governing the waterborne transportation of goods between U.S. ports, and the shipment of oil by common carrier pipeline. Based on the advice which industry has provided the DOE, the SSPs allow the purchasers approximately 15 days, after first being notified as successful offerors, to arrange for taking delivery of SPR oil. However, this time allowance is essentially precautionary, and many purchasers should be able to complete the arrangements sooner.

The final event is the physical delivery of SPR oil. Typically, the Notice of Sale will require commencement of oil deliveries no later than 30 days after it was issued. Although the timing is difficult to quantify with certainty, deliveries could commence as soon as the 16th day after commencement of the sales process (the day after the point in time when the first sales contracts could be awarded and the commercial terminals are ready to throughput oil), to the extent that purchasers of SPR oil are able to provide the financial guarantees and arrange transportation expeditiously.

These advance deliveries are not expected to occur at the SPR's maximum sustainable average rate of 3.5 million barrels per day. For example, approximately 40 percent of that 3.5 million barrel per day capability must be transported by pipeline since the SPR's terminals do not have sufficient capacity to move it all by marine vessel. U.S. pipeline companies typically require that firms desiring to transport oil nominate the quantity to be transported by the 25th of the month prior to the month in which the oil is to be shipped. However, advance deliveries by pipeline could take place if: the timing of the sales process is such that the successful offerors are selected and notified in time for normal pipeline nominations to be made; some of the purchasers already have made nominations of other foreign crude no longer arriving at the pipeline or continuing imports are readily diverted to another pipeline or terminal; or the pipelines are willing to waive their notice requirements. Such events are scenario-dependent and difficult to predict in advance, although it is likely that to some extent one or more of these situations will occur. In the same manner, the availability of vessels for early deliveries is also uncertain, although at least some vessels should be available to lift SPR oil on short notice.

It should be noted that the DOE has under consideration several possible administrative modifications in the SPR oil sale process, which could enhance the speed and effectiveness of the process. These include prequalifying bidders, limiting the universe of eligible bidders, and utilizing a price index to keep bid prices in line with market changes.

In addition, DOE supports legislation that would provide the Secretary of Energy with authority to sell incoming SPR oil prior to a drawdown decision. Under existing law, oil destined for the SPR cannot be sold until a drawdown decision is made by the President. It could be diverted from the SPR if contract deliveries were terminated, releasing some of the oil into the world marketplace, but without any control over its destination by the United States Government. Authority for the pre-drawdown sale of incoming cargoes destined for the SPR could help accelerate the release of oil to the domestic market.

Dr. VERLEGER. Senator.

Senator BRADLEY. I mean, you know, this is a hearing on the Strategic Petroleum Reserve. I do not think it is too much to ask to know how you get oil out of the reserve? What the time frame is? I mean certainly you can provide it for the record.

Do you know, Mr. Verleger?

Dr. VERLEGER. Senator, as I understand it—unless I have been working at the institute on this book for too long—the agency can issue under an expedited basis a notice of an auction. But it is my impression that the bidders have five days to submit bids.

So if you are on day one, and you accelerate it, maybe within seven days you have bids. The last notice of sale says that those bids have to be good for 10 days. So that if I am making an offer for oil as Exxon or as PHIBRO—the Solomon Brothers affiliate that owns a number of refineries—I have to make my bid at $50 a barrel. I have to make it good for 10 days.

Senator BRADLEY. So you have to bid 50 as you see the price?

Dr. VERLEGER. Well, it means that if the going market is 60 given the way that these financial market——

Senator BRADLEY. Right.

Dr. VERLEGER [continuing]. Systems work, I would bid 45, because I have to put a very large option premium in there for making this offer to the government.

Senator BRADLEY. Right, right.

Dr. VERLEGER. And I will not know then—so from day one it will be at least two weeks before I know whether I have won any oil.

Senator BRADLEY. So——

Dr. REISCHAUER. But on the other hand just to——

Dr. VERLEGER. Yes, go ahead.

Dr. REISCHAUER [continuing]. Feed you back one of your arguments, a lot of this runs on expectations and some announcement value would certainly be in a presidential statement that we are going to action off part of the SPR because of this crisis. And so one would not expect markets to be totally unresponsive, you know, until the physical oil is in people's hands.

Senator BRADLEY. But for the value, for the announcement value to have impact, the market has to believe that it——

Dr. REISCHAUER. That it is going to happen.

Senator BRADLEY [continuing]. Is going to happen.

Dr. REISCHAUER. Right.

Senator BRADLEY. To know that is going to happen within a relatively short period of time.

Dr. REISCHAUER. Correct.

Senator BRADLEY. Now, your point is that this 18 day period, this 5 day waiting period, 10 day carrying period, et cetera, et cetera, is not as good as what?

Dr. VERLEGER. As immediate—the Federal Reserve did not—if you go back to October 17, 1989——

Senator BRADLEY. Right.

Dr. VERLEGER. The Federal Reserve Board did not say, well, in two weeks we are going to supply money to primary broker dealers. They said that tomorrow morning we are going to supply money to primary broker dealers.

Senator BRADLEY. So are you saying that now we would have to identify——

Dr. VERLEGER. The firms that are——

Senator BRADLEY [continuing]. A certain number of primary dealers that ideally——

Dr. VERLEGER. The Fed has done that for years.

Senator BRADLEY. That might be a little plum people might want to——

Dr. VERLEGER. The Federal Reserve Board set a criteria of financial reliability.

Senator BRADLEY. Yes. So you would say three or four or five, the idea is——

Dr. VERLEGER. 25.

Senator BRADLEY [continuing]. You would say, okay, tomorrow these four or five bid?

Dr. VERLEGER. That is right. And they would know by the end of business.

Senator BURNS. And the reason that cannot take place now is that there are too many bidders for it to happen?

Dr. VERLEGER. Senator, it is my understanding that it is partially legislative that the sales—you would have to reauthorize, rewrite the whole sales provision to permit something like that to take place.

Senator BRADLEY. Well, does anybody disagree with this approach? Does anybody here believe that this is not wise, prudent, patriotic? [Laughter.]

Mr. Gentile?

Mr. GENTILE. Senator, could I introduce a member of the staff of the Strategic Petroleum Reserve who may be able to answer this question a little better?

Senator BURNS. Yes, that is fine.

Mr. GENTILE. John.

Mr. BARTHOLOMEW. Yes, I am John Bartholomew, Director of the Office of Strategic Petroleum Reserve. What Dr. Verleger says is essentially correct in terms of the timing mechanism, recognizing that the majority of the time that we are talking about in this 18 day process is the time required for industry to respond to our initiatives in terms of responding to the offer for sale, responding with letters of credit, performance guarantees matters that are typical of that type of commercial operation.

A lot of that time can be saved, however, with a contingent sale process, whereby we would announce instantly the availability of the oil to the marketplace. Then the actual consummation of contracts would be contingent upon a following policy decision, such as the drawdown decision itself.

So I think we can forestall a lot of the time delay that Dr. Verleger talks about with that kind of action.

Senator BRADLEY. And, Dr. Verleger, do you have a critique of what the representative of the Strategic Petroleum Reserve said or do you agree?

Dr. VERLEGER. I am afraid I disagree on contingent contracts. A friend of mine, John Lyles from Louisiana Lands handed me a note reminding me that once you announce that sale, that you are going to actually trigger hording—hording has a pejorative implication.

But if there is an expectation that prices are going up rapidly, there is a strong financial incentive to build inventories, and that will take place.

Contingent sales, I am afraid—unless the contingency is strictly on the buyer—the buyer gets the oil if he completes the contract—do not satisfy the problem.

I would also note, sir, that I have worked with the oil industry closely on the evolution of oil as a commodity. I have consulted. I worked at Drexel-Burnham for a while in the oil division.

The oil industry now understands how to do contracts very quickly. Trading in the volume of oil today is something like 200 million, 250 million barrels of oil a day. That is five times world consumption. It was 8 million to 10 million barrels a day max in 1980.

And the oil firms understand that they have 10 minutes, 15 minutes—if they are lucky, and sometimes it is five seconds—to make decisions. And they are very good at doing that, particularly when markets move. All of the companies that are still in business are very good at trading oil and managing their portfolio as long as they know that they can get supplies.

So that I do not think any—I think that the arguments that the industry has used in the past, that they need time to review this, is just incorrect.

Senator BRADLEY. Let me ask you all one other question. The department did an analysis on the advisability of regional reserves. And that was done in reference to I think a bill offered by the Senators from Hawaii, who were interested in having a reserve in Hawaii on one of the islands.

It came back and the DOE concluded the only possibly appropriate regional petroleum reserve would be on the East Coast. Now, although that would be more expensive than some place on the Gulf Coast for example.

Do you agree with that? That the only possible regional reserve would be on the East Coast?

Mr. GENTILE. Senator, under the current law the requirement for a regional reserve means that, it would require more than 20 percent imports of a refined product to meet the statutory test over the past 24 months in terms of exceeding that level, over the past 24 months to qualify as a regional reserve.

The East Coast area is the only area that I am aware of that exceeds that 20 percent criteria.

Senator BRADLEY. So that is the basis for the recommendation that it be on the East Coast?

Mr. GENTILE. Yes, sir.

Senator BRADLEY. Do you feel that a regional reserve could play any role whatsoever in terms of the various price problems that we have had? And if you had a regional reserve, you might make the argument that delivery could be sooner to the market, let us say? Dr. Verleger?

Dr. VERLEGER. You were looking at me.

Senator BRADLEY. No, I was looking at whoever had willing eyes. [Laughter.]

Dr. VERLEGER. Your prior experience. There are serious logistical problems in building regional reserves. But if your goal, the goal of

crisis management is to avoid large price increases, I think that we have neglected—we probably should build product reserves.

The reason being again this expectational phenomenon that if there is an announcement of a crisis, or of the consumer should—the American public sees it on television and they perceive that prices are going to increase rapidly, the rational profit maximizing or a cost minimizing thing for a consumer to do is go fill his tank.

And that process of increase or surged demand pushes retail prices up, wholesale prices up and will tend to pull crude oil prices up, even if the refineries are fully supplied.

Now the trouble with it is that it is extremely expensive and extremely difficult to manage product reserves. Our Clean Water Act and other legislative mandates are making it more expensive to build and operate terminals, as you saw when you were up on the Arthur Kill.

They are having problems right now with many of the existing facilities. And so that the storage of product—not just on the East Coast but probably also on the West Coast and Hawaii—would be an expensive proposition and one that I certainly have not looked at in detail, and I do not think the department has looked at in detail.

Senator BRADLEY. So are you saying that it might indeed once it was there have some impact on the price surge. But that the cost of assuring it is quite large?

Dr. VERLEGER. Correct.

Senator BRADLEY. And that there has not been a sufficient cost benefit analysis of the trade-off of potential dampening of price increase weighed against the cost of the construction and location and assured environmental acceptability. Is that right?

Dr. VERLEGER. To my knowledge, given the current market environment, that is correct.

Senator BRADLEY. Does DOE need a piece of legislation to do that kind of analysis, do you think?

Mr. GENTILE. No, sir.

Senator BRADLEY. Well, last winter when I wrote a letter to the secretary on the advisability of the regional reserve, I did not hear anything from him for a while. I wondered if that is something you might do? Do you need something in writing in order to get back to us with that kind of cost benefit analysis? Your assessment as to the cost benefit of building the regional reserve versus having the potential price surge?

Mr. GENTILE. No, sir, I do not think we need—we do not need anything in writing.

Senator BRADLEY. Okay. When could I expect to hear from you on that?

Mr. GENTILE. Senator, when the Secretary responded I think he pointed out some problems, namely, regarding why the Petroleum Reserve was limited to crude oil and the concerns regarding product life, shelf life, also what would be included in the Reserve. What products would be stored——

Senator BRADLEY. What products should be stored—I have his letter here.

Mr. GENTILE. So, what is being looked at in the National Energy Strategy are exactly some of those issues. And we would hope that

by the end of the year, that we will be identifying some of those and coming up with some possible solutions.

Senator BRADLEY. Now, I do not understand that. So what is the time? When could I get this?

Mr. GENTILE. The time frame, sir, is that the National Energy Strategy will be presented before the President at the end of the year. And the President hopefully will present that publicly in January of next year.

Senator BRADLEY. Okay, so you are saying by January 1991 you will have a cost benefit analysis that relates to the value of a regional reserve, the potential dampening of surge, therefore saving of consumer cost—which is enormous—versus the cost of constructing the reserve itself and assuring its environmental suitability and acceptability. Right? Is that what——

Mr. GENTILE. We will be looking at some of those issues within the National Energy Strategy, sir.

Senator BRADLEY. Well, what I am asking you is, do you need a little amendment up here to assure I get the study as I have described it? Or will you actually produce the study? That is what I want to know. It is an efficiency question. [Laughter.]

Mr. GENTILE. We can do that, sir, I believe.

Senator BRADLEY. Okay, by January?

Mr. GENTILE. Hopefully before then, sir.

Senator BRADLEY. Great. Well, thank you very much. I thank the witnesses very much for their testimony. And since I have been given the gavel for this very important event, the hearing is now over.

[Whereupon, at 3:54 p.m., the hearing was adjourned.]

# APPENDIXES

## APPENDIX I

## RESPONSES TO ADDITIONAL QUESTIONS

**Department of Energy**
Washington, DC 20585
April 19, 1990

The Honorable J. Bennett Johnston
Chairman
Committee on Energy and Natural Resources
United States Senate
Washington, D.C. 20510

Dear Mr. Chairman:

On March 20, 1990, Robert H. Gentile, Assistant Secretary, Fossil Energy gave testimony before your committee on the Strategic Petroleum Reserve and S. 2088. Mr. Gentile was accompanied by Richard Furiga, Deputy Assistant Secretary, Petroleum Reserves; Howard Borgstrom, Director, Office of Planning and Financial Management; Guy Caruso, Director, Office of Energy Emergency Policy and Evaluation; and Michael R. McElwrath, Principal Deputy Assistant Secretary, Office of Fossil Energy.

Following that hearing, you submitted a written question for our response to supplement the record. Enclosed is the answer to that question.

If you have any questions, please have your staff call Lillian Owen at 586-8687. She will be happy to assist.

Sincerely,

Jacqueline Knox Brown
Assistant Secretary
Congressional and Intergovernmental Affairs

Enclosure

QUESTION FROM SENATOR JOHNSTON

Question: I am concerned that it may be several months before both Houses of Congress can agree on and pass legislation authorizing oil leasing. I am also concerned that the window of opportunity for negotiating a favorable oil leasing arrangement may be short. What are DOE's plans for pursuing oil leasing in the next several months?

Answer: The Department believes that a number of activities in preparation for an attempt to negotiate a cost-effective lease agreement can be conducted while Congress is in the process of acting on the authorizing legislation. During this period, the Department expects to develop negotiating plans and to initiate the interagency review of those plans. We are also hoping to continue exploratory discussions with one or more oil producing nations. Once the authorizing legislation is passed, and final negotiating plans are approved, we will proceed expeditiously with negotiations in an attempt to conclude satisfactory lease arrangements. Under no circumstances will these exploratory discussions or negotiating plans make any type of commitment to lease in the absence of legal authority to lease. Further, all of the Department's activities will be consistent with the President's policies.

J. BENNETT JOHNSTON, LOUISIANA, CHAIRMAN
DALE BUMPERS, ARKANSAS
WENDELL H. FORD, KENTUCKY
HOWARD M. METZENBAUM, OHIO
BILL BRADLEY, NEW JERSEY
JEFF BINGAMAN, NEW MEXICO
TIMOTHY E. WIRTH, COLORADO
KENT CONRAD, NORTH DAKOTA
HOWELL T. HEFLIN, ALABAMA
JOHN D. ROCKEFELLER IV, WEST VIRGINIA
JAMES A. McCLURE, IDAHO
MARK O. HATFIELD, OREGON
PETE V. DOMENICI, NEW MEXICO
MALCOLM WALLOP, WYOMING
FRANK H. MURKOWSKI, ALASKA
DON NICKLES, OKLAHOMA
CONRAD BURNS, MONTANA
JAKE GARN, UTAH
MITCH McCONNELL, KENTUCKY
DARYL OWEN, STAFF DIRECTOR
D. MICHAEL HARVEY, CHIEF COUNSEL
FRANK M. CUSHING, STAFF DIRECTOR FOR THE MINORITY
GARY G. ELLSWORTH, CHIEF COUNSEL FOR THE MINORITY

United States Senate
COMMITTEE ON
ENERGY AND NATURAL RESOURCES
WASHINGTON, DC 20510-6150

April 2, 1990

The Honorable Robert H. Gentile
Assistant Secretary for Fossil Energy
U. S. Department of Energy
1000 Independence Avenue, S.W.
Washington, D. C. 20585

Dear Mr. Gentile:

I would like to thank you for your recent appearance at the hearing held by the Committee on Energy and Natural Resources on March 20, 1990. Your time and effort to provide the Committee with your views regarding the Strategic Petroleum Reserve is greatly appreciated.

In order to assist the Committee in its consideration of S. 2088, I am attaching an additional question for inclusion in the hearing record. I would appreciate your sending your responses to Karl Hausker of the Committee staff by April 18, 1990.

Again, thank you for your testimony. I look forward to receiving your additional comments.

Sincerely,

J. Bennett Johnston
Chairman

JBJ/kah

29-532 0 - 90 - 6

Question for the Department of Energy
from Sen. J. Bennett Johnston
Hearing on S. 2088
March 20, 1990

1. I am concerned that it may be several months before both Houses of Congress can agree on and pass legislation authorizing oil leasing. I am also concerned that the window of opportunity for negotiating a favorable oil leasing arrangement may be short. What are DOE's plans for pursuing oil leasing in the next several months?

# APPENDIX II

## ADDITIONAL MATERIAL SUBMITTED FOR THE RECORD

**Massachusetts Institute of Technology**
Center for Energy Policy Research
M. A. Adelman
Professor Emeritus, Department of Economics
One Amherst Street (E40-429)
Cambridge, MA 02139
Telephone (617) 253-1680 * FAX (617) 253-8013

1990 APR 20 PM 11:40
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PLEASE RETURN

April 6, 1990

Hon. J. Bennett Johnston
U. S. Senate
Committe on Energy and Natural Resources
Senate Office Building
Washington, D. C. 20515

SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES
RECEIVED
APR 23 1990
WASHINGTON, D.C. 20510

Hon. Philip R. Sharp
U. S. House of Representatives
Committe on Energy and Commerce
House Office Building Annex No. 2
Washington, D. C. 20515

Gentlemen:

My attention has been drawn to the Inter-agency Report on the Strategic Petroleum Reserve, issued by the Department of Energy. The second part of this report deals with the optimum size of the SPR. It shows an appalling ignorance of the oil market, and of its history.

The report treats oil shocks as accidents. The theory, or dream, is that the OPEC nations do not want an oil shock, and will expand their capacity to the limit to cover any shortfall in consumption. Hence even a large loss of supply would not have any price effects, and we need only a small SPR, if any.

There are two basic errors. First, both of the price explosions of the 1970s were deliberate acts by oil producing nations.

Second, even the fear of a production cutback is enough to produce a shock. The economic damage to consumers and refiners, of being without supply, is so great that they try to guard against the mere possibility by buying to hoard not for use, and at even extravagant prices.

The response may be out of all proportion to the stimulus, because nobody knows how much will be produced, or when the cutback will end. We have twice seen a firestorm: the higher the price goes, the more incentive to hoard, which raises the demand for oil, and raises the price again.

In 1973, the production cutback was very roughly of 4 million barrels daily, 8 percent of world consumption. It lasted only two months. For years the OPEC nations had been raising their

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excise tax as a price floor, and in 1973 Saudi Arabia scared buyers by the threat of a cutback. The outbreak of war was a chance too good to be missed. The Arab nations which cut back in late October aimed to raise prices. They made political demands, achieved none of them, and forgot them after two months. But in late December they had combined with their non-Arab partners to raise the price floor, government take per barrel, to $7 from about $1.50 at the start of the year.

The production cutback was over by end-December. During 1974, as demand stagnated and excess capacity became massive, they managed to raise the tax floor to about $10.50. As one expects in a cartel, the biggest producer took the lead: Saudi Arabia.

In 1978, oil consumption was clearly declining. Prices were weak, and only firmed in mid-year because OPEC was expected to meet soon to raise official prices, then to validate the higher prices by reduced production. The Iranian Revolution reduced output, which others replaced easily, and December prices actually weakened. Iranian production was expected to return, and falling prices were feared. Accordingly, Saudi Arabia cut production on January 21, 1979--after previously telling the Carter Administration it would not cut.

This cut immediately set off a great price surge. By mid-March prices seemed to have stabilized at a much higher level. But on April 1 the Saudis cut production again, this time without notice. Again the price soared.

At all times there was massive excess capacity. Saudi Arabia alone, or any large OPEC producer, could immediately have brought prices back down by producing to the limit. They did not do so because they wanted higher prices. With no shortfall of production, the price went from $12 to $34.

The Carter Administration made itself ridiculous by relying on the goodwill of Saudi Arabia. They agreed to suspend SPR purchases in return for a Saudi promise to maintain output, a promise broken twice in 1979, like many made before. They sent the Secretary of Energy to Riyadh in February 1980 to beg the royal assent to resume SPR purchases. Permission not granted. At this point, the Congress took a hand, and the useless self-abasement stopped--for the moment.

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The Bush Administration is plainly subject to some of the same delusions as its predecessors. Its aim is said to be "to establish closer ties with the Gulf states ... to ensure that the oil will continue to flow". [Petroleum Economist, February 1990, p. 60] So too the Carter Administration used to boast of "unprecedented closeness in the Middle East". There is no excuse for not learning the lesson: the producer nations aim to produce what will give them the biggest revenues, no more or less. Neglecting the SPR, and seeking "closer ties" will simply make them bolder.

Inflation-adjusted prices today are lower than 1978. OPEC is more hungry. Their only way to raise prices is to maintain cohesion in cutting output. They have had minor successes, and will keep trying. At any time, they could overshoot. They do not know current consumption or inventories, and will not release accurate production figures even to each other. The cartel is flying blind, and could easily cut too hard, injuring even themselves, for lack of information.

The mission of the SPR is more prevention than cure. Making oil immediately available quells panic. With the oil weapon blunted, the chances are small that the producing nations will try it again. If they blunder into an excessive cut, which does not work, they will rescind it. For our own safety, we need a bigger SPR than we now have, and should waste no more time in building it.

Yours sincerely,

M. A. Adelman

NEW YORK STATE ENERGY OFFICE

WILLIAM D. COTTER
COMMISSIONER

April 3, 1990

Honorable J. Bennett Johnston
Chairman
Senate Energy Committee
364 Dirksen Building
Washington, D.C. 20510

Dear Senator Johnston:

We are submitting the attached testimony for inclusion in the hearing record on your bill S.2088, "Energy Policy and Conservation Act Amendments of 1990."

Our Office supports the expansion of the Strategic Petroleum Reserve (SPR) to the one billion barrel level as the primary defense against an interruption of foreign crude oil supplies.

We also believe that the recent sharp price escalation in the heating fuels market underscores the continuing need for a Regional Petroleum Product Reserve (RPR) as a component of the expanded SPR. Such an emergency response capability would allow government to quickly react to minor supply disruptions and mitigate emergency stockpiling and unjustified price increases.

I trust you will find our comments useful in your consideration of the SPR amendments.

If you or your staff would like to discuss this further, contact me at (518) 473-3727.

Sincerely,

Charles B. Searle, Jr.
Chief Petroleum Planner

CBS/cc
Attachments

TWO ROCKEFELLER PLAZA • ALBANY, NEW YORK 12223

Testimony Before The Senate Energy Committee
On Proposed Bill S.2088 "Energy Policy And
Conservation Act Amendments of 1990"
Honorable J. Bennett Johnston - Chairman

Submitted By:

The New York State Energy Office

William D. Cotter
Commissioner

April 3, 1990

SUMMARY

The proposed legislation would amend the Energy Policy and Conservation Act (EPCA) to extend certain authorities through 1993 and require the following:

- Amend the Strategic Petroleum Reserve (SPR) Plan to prescribe plans by January 30, 1992 to expand the SPR to the one billion barrel level.

- Provide authority to lease privately-owned storage facilities and/or crude oil to attain this goal.

- Allow the President; upon determining that a severe energy supply interruption may be imminent and the world price of crude oil has, as a result, increased substantially, to suspend SPR oil fill and/or allow the direct sale of already-purchased petroleum that has not yet been injected into the SPR.

- Liberalize the administration of the SPR in regards to spending authorized funds for leasing activities and in meeting statutory requirements for SPR oil fill.

The New York State Energy Office unequivocally supports the expansion of the SPR to the one billion barrel level; however, it has been our long-held position that the financing of the Reserve should be derived from current revenue sources. The need for a larger Reserve to provide adequate protection against a possible disruption in supplies of imported crude oil is a direct result of the rising levels of petroleum consumption that have been occurring since 1985. The cost of this protection should be borne by current consumers, not by future generations of Americans who may prove to be more energy efficient.

In the most recent analysis of alternative financing methods for the SPR, the Department of Energy (DOE) found that "...leasing of SPR oil through competitive commercial arrangements is unlikely to result in contract terms favorable to the U.S. government... leasing oil for the SPR would be a viable alternative only to the extent that its costs would be less than the costs of direct purchase[1]." The exception might be a direct, non-competitive lease negotiated with an oil producing country with surplus capacity.

While the leasing of crude oil for storage in the SPR may prove to have merit, we cannot provide support for the concept until DOE can produce a lease agreement that results in equal or lower real costs compared to outright purchase. However, the economics of leasing already available storage facilities to hold government-owned and controlled crude oil for SPR purposes and petroleum products for Regional Product Reserve (RPR) use, are likely to be more favorable and should be explored.

The language contained in S.2088 specifically reserving drawdown and distribution authority for DOE should be approved to maintain public sector control under any oil leasing arrangement.

Language in the bill that would allow the use of all appropriated SPR funds, including administration and construction funds, for leasing purposes should be revised. We believe that the dual-track nature of the funding for the SPR over the years has worked well. The construction of additional storage capacity should continue on a predictable basis to minimize costs, while the purchase or leasing of crude oil should remain a function of political and fiscal realities and the world price of oil.

Overall, we believe that changing market conditions at the national, international and regional levels require a more timely and effective structure for the SPR that would include regional reserves of refined petroleum products (RPR), as called for in the original

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[1]Executive Summary, "Report to the Congress on Alternative Financing Methods for the Strategic Reserve," U.S. Department of Energy, February 1, 1990, p.15.

EPCA authorizing legislation. Specifically, we recommend that a 20 million barrel RPR containing distillate #2 fuel oil be established in the Northeast as part of the expansion of the SPR to one billion barrels. While the overall role of the crude oil stored in the SPR to replace refinery feedstocks in the event of a severe loss of imported supplies is still valid, experience has shown that the most severe economic dislocations during such events occur well before the oil in the SPR could be released, auctioned, refined into usable products and shipped to the regions experiencing a shortfall.

Further, the role of the SPR should be modified to reflect the evolution of the petroleum marketing and distribution industry since the establishment of the Reserve. Recent efforts to improve communications between oil producer and consumer nations and an increasing reliance on free market forces to establish price and supply levels have resulted in significantly different conditions in the world marketplace for oil than existed at the time the SPR was established.

Rapid price increases in gasoline and heating fuels that have occurred over the last decade have been a result of refining or distribution disruptions, or surges in demand. These relatively minor system problems exert undue influence on market prices due to overall higher demand levels, near-capacity operation of refineries and pipelines, and the volatile effect of speculative trading on commodity exchanges.

We believe that, in a disruption, the ability to respond immediately to a loss of supplies will be more important to the economic health of the nation than the absolute length of time that the SPR will be able to be drawn down. The establishment of a Northeast distillate fuel oil RPR would enable the federal government to respond immediately to any disruption in the supply of this vital heating fuel. In a serious disruption this would provide the time for the SPR to attain full operation and increase the availability of all fuels to all regions of the country.

A Regional Petroleum Product Reserve (RPR) in the Northeast would complement the crude oil supply security role of the Strategic Petroleum Reserves located in the Gulf Coast area. While we appreciate the consideration of this concept in the National Energy Strategy process, we feel that a critical need exists for an RPR and that this concept should be strongly advocated on its own merits by Congress and the Department of Energy (DOE).

While these remarks represent the viewpoint strictly of the New York State Energy Office, the goal of establishing Regional Reserves of crude oil and refined petroleum products has long received broad support by other states in the Northeast. A resolution supporting this concept was approved at a special meeting held in January of the Coalition of Northeast Governors (CONEG) to assess the impact of this winter's heating fuel crisis.

New York and other States in the region will continue to explore possible public policy actions to ensure that expanded petroleum product inventory levels are available to meet future peak demand levels.

## BACKGROUND

### Appropriate Size of the SPR

The SPR is the primary existing federal response mechanism available to deal with an interruption of petroleum supplies. Given the rapidly escalating levels of crude oil imports over the past several years, to approximately 42 percent of national oil demand in 1989, an expansion of the SPR to at least one billion barrels is clearly justified.

Presently, the SPR has a storage capacity of 600 million barrels and is filled with 590.2 million barrels of crude oil. At current crude oil and product import levels through November, 1989, the reserve represents an 81 day supply. 1989 was the first year since 1982 that the SPR level of potential protection had fallen under the target 90 day import replacement level mandated under the International Energy Agency Emergency Sharing System.

By 1992, national imports are estimated by our Office to expand to 9.15 mmb/d. Even if the SPR reaches its 750 million barrel target by then, an unlikely event at current fill rates, it would still only equate to an 82 day protection level. To maintain even this level of protection through the year 2000, an SPR level of one billion barrels will be needed, at a projected import dependence level of 12.1 million barrels per day.

This Year's Market Turmoil

Of even more importance to those of us in the Northeast is the apparent inability of the petroleum distribution system to respond to unusual conditions with reasonably-priced supplies, such as occurred last summer in the gasoline market and this winter in the heating fuels markets. It is estimated that the price run-up in heating oil between December and January alone cost New York State consumers an additional $1.12 billion, or $62.54 per person.

The spot shortages of refined petroleum products, including propane and #2 heating oil in the Northeast during this heating season, resulted in economic dislocations in New York State's commercial and industrial sectors and sky-rocketing price increases at the wholesale and retail levels. Statewide average prices of heating oil increased by over 46 percent between Thanksgiving and the beginning of the year, while propane prices rose by 43 percent.

This winter provided a classic example of the vulnerability of the Northeast to supply disruptions of heating fuels during periods of cold weather. Most of the distribution problems that occurred during this period were similar to past events, such as the Gulf Coast refinery outages and delayed ocean-going product shipments. However, combined with a 30 percent colder than normal December and slightly below normal inventory levels going into the heating season, the situation snow-balled into a near-crisis situation.

Although to the best of our knowledge no distillate customers went without delivery, the rapid escalation in prices threatened customers ability to pay and raised businesses' accounts receivables. We have found that the cost/price run-up continues to overhang the market, as residential customers continue to pay more for #2 fuel oil now than in early December. The average retail residential price (according to our biweekly surveys) has declined by only 35¢/gallon since the peak level reached during the first week of January. This compares to the overall 43¢/gallon price rise at the wholesale level.

Propane distributors were severely impacted during this period. Due to the smaller size of this industry, however, we were able to work closely with them to ensure all priority needs were met. Deliveries to most temporary construction space heat and recreational use customers were suspended, while dealers shared available supplies to ensure residential customers were provided with fuel for heating their homes. The response and cooperation of the industry mitigated what could have been a severe threat to the health and welfare of the people of our State.

Long Term Changes in the Petroleum Industry

After the supply disruption resulting from the Iranian Revolution in 1979, and the attendant price escalation for all petroleum products, oil demand in New York State declined over 25 percent by 1985. At the same time, refinery capacity in the State virtually disappeared, mirroring the rationalization of the industry occurring nationwide. Finally, several major oil companies ceased operations in the State, leaving consumers to depend more heavily on smaller independent suppliers.

Concurrently, a surplus of product on world markets and breakdown of traditional contract arrangements resulted in the growth of the spot and futures markets in setting consumer petroleum product prices. These factors led to increased price volatility in the market and encouraged suppliers and retailers to reduce long-term inventory levels to minimize costs. The rising cost of underground product storage as a result of environmental concerns exacerbated this trend.

At the national level, EIA data show that distillate fuel oil stocks during the peak of the heating season[2] declined by 43.4 percent between 1980 and 1989. At the same time, distillate fuel use (measured as product supplied) only declined 11.25 percent. This reflects a 36.25 percent decline in the available days of supply in inventory over the decade; from over 57 days in 1980 to 36 days in 1989.

Once again, rising demand (distillate use in New York State has increased 27.0 percent between 1985 and 1988[3]) has exposed consumers to an increased risk of supply difficulties and price run-ups.

The rationalization of the refining industry and reduced operating costs represented by lower inventory levels are claimed by many to result in the lowest cost to consumers for petroleum products, over time. However, the sudden price increases that resulted from modest interruptions of supply, both in the 1983/1984 and the 1989/1990 heating seasons, caused major economic burdens for typical home heating fuel customers in each case. Homeowners and businesses are better able to function in a predictable price climate than in one of extreme volatility. This is especially true when the product is a heating fuel and it is January and the thermometer reads 20°F or lower.

Our analysis indicates that increasing dependence on foreign petroleum in New York, the Northeast and the United States as a whole is not going to disappear. Given this reality and the vulnerability of the Northeast specifically to distribution disruptions, the establishment of a Regional Petroleum Product Reserve, as part of the expanded SPR, is the most practical and cost-effective measure the federal government can take to protect consumers and businesses against shortages and exorbitant price increases.

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[2]DOE/EIA "Monthly Energy Review". January data used for comparative purposes.

[3]New York State Energy Office, Annual Energy Review, 1988.

## WHAT SHOULD BE STORED IN THE SPR

S.2088 provides an opportunity to respond to the issue of which petroleum products should be stored in a RPR. Based on 1988 EIA petroleum supply and marketing statistics[4], residual oils, distillate fuels (including kerosene) and propane exceeded the 20 percent import dependence RPR trigger for PADD I, established under EPCA, Section 157 (see Table 1). Gasoline import dependence was approximately 15 percent during 1988. Relying on the EPCA guidelines, the Northeast's import reliance levels during 1988 for distillate fuels, propane and residual oil would each technically justify the establishment of an RPR.

TABLE 1
1988 PADD I Regional Dependence On Imports[5]

| | Volume of First Sales (thousand gallons) | Refined Product Imports (thousand gallons) | Direct Import Dependence (percent) | NYS Dependence* |
|---|---|---|---|---|
| Motor Gasoline | - | 5,564,916 | - | |
| Gasoline Blending Stocks | - | 752,766 | - | |
| Total Finished Gasoline | 41,804,534 | 6,317,682 | 15.1 | 14.8 |
| Propane | 2,088,669 | 570,906 | 27.3 | 18.1 |
| Distillate, including kerosene | 20,650,500 | 4,534,110 | 22.0 | 23.5 |
| Residual, including #4 | 11,373,670 | 8,919,708 | 78.4 | 76.6 |

* SEO Estimates

While the three petroleum fuel groups satisfy the Congressional trigger, there is no basis to conclude that an RPR would be equally useful or necessary in responding to shortages of each fuel category.

[4]Source: 1988 U.S. DOE, EIA Petroleum Supply Annual and Petroleum Marketing Annual Statistics.

[5]Ibid.

Propane

The propane market in the Northeast is characterized by seasonal demand and dispersed service territories in rural areas. Daily demand averages from 49.8 thousand barrels to 132.5 thousand barrels daily, depending on the season. Six of the eleven Northeast states consume less than 1.8 million barrels of propane annually. The propane market represents (in terms of demand) only 9-10 percent of the distillate market.

This relatively low level of consumption, combined with the geographically widespread nature of the market, would likely mean that only one RPR site could be cost-justified. Such a single facility would be of marginal benefit to dealers located some distance away.

Residual Fuel Oil

Residual fuel consumers in the Northeast rely on foreign sources for slightly more than 76 percent of their needs. However, these products tend to be consumed by large volume users that have the capacity to enter into direct contracts with major independent suppliers and integrated oil companies. Over 75 percent of residual oil demand in New York State, the state with the largest consumption in the Northeast, is burned in the electric utility sector. A similar demand pattern is typical of other Northeast states.

In New York State, electric utilities are required to maintain a minimum fuel inventory equal to 75 percent of their peak consumption over a 45 day period, or about 34 days of backup supply. Other states have similar minimum stock standards for their electric utilities. Consequently, electric utilities already keep an amount of supply on hand that effectively represents a regional reserve for the largest segment of the residual fuels market.

Administering a regional residual oil reserve would most likely result in major operating obstacles that could seriously affect the efficiency of such an RPR. Unlike distillate, residual fuels with varying sulfur contents are sold across the Northeast.

Conceptually, a residual RPR should store different quality product to meet this demand pattern. More importantly, to maintain residual oil viscosity, it must be heated, especially in the cold weather season. This involves special equipment costs, steam or other heating expenses as well as ordinary administrative overhead.

Motor Gasoline

Administering a gasoline RPR, even though this is the most common and widely used petroleum product, presents several unique problems. The Northeast is less than 20 percent dependent on direct imports for its gasoline. Gasolines take the form of several grades and suppliers argue strongly for the special merits of these unique fuel qualities. Gasoline deteriorates faster than most other refined products and this short shelf-life would necessitate frequent RPR turnover. Also, users can reduce their gasoline needs for a limited time by delaying travel, shifting to mass transit, or employing alternative fuel vehicles. These obstacles and the ability of demand restraint measures to temporarily reduce gasoline demand argue against developing an RPR for this fuel.

Distillate Fuels

The continuous flow of distillate fuels, which are consumed in the residential sector for space heat, in the commercial and industrial sectors for power and space heat and in the transportation sector to move goods and people, has become increasingly exposed to supply uncertainty. The expanded role of imported product in meeting the Northeast's current 751.4 to 1,984.0 thousand barrel daily distillate requirement (depending on season) threatens the security of these supplies. Changed oil industry supply and distribution practices de-emphasizing inventory build-up increase the risks of short term cold weather or oil spill-related distillate supply imbalances and price spikes.

Distillate fuels are a special class of petroleum products warranting strong consideration for storage in an RPR. These fuels (#2 home heating oil and diesel fuel in particular) are vital to the health and welfare of New York State's citizens. An estimated

42 percent[6] of the households in the Northeast are heated with fuel oil and generally they have a storage tank in the 275 gallon to 550 gallon range. Diesel fuel is the primary liquid fuel for truck, bus and train transport.

Further, these fuels are supplied through a complex and often eroded multi-level distribution network consisting of domestic and foreign refiners, brokers, futures market players, importers, regional independents, and local dealers, and are subject to sudden peaks in seasonal demand. Interruptions in the supply of these fuels, or even the possibility of such an event, inevitably lead to sudden increases in prices, which reduce discretionary household income, increase business costs and shift financial resources out of the State to attract additional supplies.

In the event of actual sizeable disruptions of supply, homes and businesses may be faced with not being able to obtain fuel to heat their residences or run their operations. This threat to the health, welfare and economic well-being of the region's consumers can be mitigated through the timely release of refined products stored in an RPR.

Simplifying the operation of such a RPR is the relatively homogenous nature of distillate fuels -- sulfur content does not significantly vary, #2 oil and diesel are quite similar and many suppliers produce their distillate product streams with similar cetane ratings.

[6]U.S. DOE/EIA Household Energy Consumption and Expenditures 1987, Part 2, January, 1990, p.2.

**TABLE 2**
**Selected Petroleum Product Demand**
**By State in the Northeast - 1987**
**(in millions of barrels)**

| State | Distillate & Kerosene | Propane | Residual Oil |
|---|---|---|---|
| Connecticut | 21.5 | 1.5 | 18.0 |
| Delaware | 4.0 | 1.0 | 3.9 |
| Maine | 12.4 | 1.2 | 7.8 |
| Maryland | 18.8 | 1.7 | 8.0 |
| Massachusetts | 38.2 | 2.5 | 34.9 |
| New Hampshire | 7.8 | 2.0 | 5.1 |
| New Jersey | 44.6 | 6.5 | 17.6 |
| New York | 75.5 | 5.3 | 69.5 |
| Pennsylvania | 59.4 | 8.1 | 19.4 |
| Rhode Island | 6.2 | 0.6 | 2.0 |
| Vermont | 4.6 | 1.1 | 0.2 |
| **Northeast** | 293.0 | 31.5 | 186.4 |

Source: U.S. DOE/EIA, State Energy Data Report, April 20, 1989.

## HOW MUCH PRODUCT SHOULD BE STORED

The loss of distillate imports to the Northeast most likely would be offset with additional deliveries from Gulf Coast refineries processing increased volumes of foreign crude oil or SPR supplies. Past analyses of the delivery time for moving stored product from the Gulf Coast to the Northeast consumer range from 12-16 days by U.S. DOE to more than 45 days by the Massachusetts Energy Office. Allowing time to adjust refining yields, procure additional crude volumes, revise consumer delivery schedules and cope with administrative delays in activating the SPR warrant developing a 30 day RPR supply level. After this time, the SPR should be operational and able to contribute to the delivery of refined products into the Northeast.

### Supply Disruption Scenarios

Based on EIA Annual 1988 petroleum marketing statistics average daily distillate sales into the Northeast ranged from 751.4 million gallons in June to 1,983.6 million gallons in January. Assuming the 1988 major supplier sales data is typical of normal seasonal trends, daily demand would fluctuate between 596 thousand barrels and 1,524 thousand barrels during the year. If the RPR is designed to fully protect all sources of distillate fuel

a 30 day benchmark would range between 17.9 million barrels and 45.7 million barrels. Given that the risk of a distillate shortage is gravest when demand is greatest, the RPR under this scenario should hold approximately 46 million barrels. As refined distillate fuels are supplied from domestic and several import sources, it is doubtful that the complete loss of distillate supplies to the Northeast would occur over an extended period.

A more reasonable worst case scenario is a disruption of distillate fuels arising from the intentional loss (embargo) of imported oil. Under this scenario, domestic resellers lose their direct imports of distillates and refiners are restricted in their access to foreign crude oil. If such an embargo extended to all import sources, an estimated 67.9 percent of domestic supplies or 1,035 thousand barrels daily (in a peak month) would be impacted. The 30 day level of protection under this scenario translates into a 31.0 million barrel RPR.

A third distillate disruption option is the loss of petroleum imports from all Persian Gulf sources. Such an event would affect an estimated 15 percent of all deliveries into the Northeast[7]. To assure timely stocks to replace Persian Gulf distillate imports and domestic distillate refined from Persian Gulf crude oil, the RPR, based on current import trends, would need to handle a 229 thousand barrel a day drawdown. To satisfy the 30 day standard, the RPR would have to hold nearly 7 million barrels.

There are an unlimited number of supply disruption scenarios available, but most would fall within the ranges of the three cases already discussed. Clearly, a RPR would have to contain more volume than the amount necessary to replace supplies lost due to a disruption. To be operational the facility must allow for unusable tank bottoms, connecting pipeline's volumes and minimum amounts to maintain system pressure.

[7]Direct distillate imports from Persian Gulf sources equals 3-4 percent and crude oils from this region account for 10-11 percent of domestically refined distillate delivered into the Northeast.

In establishing a volume target for the Northeast RPR, a mid-level reasonable degree of protection should be pursued to allow for the region's projected increasing dependence on foreign (especially Persian Gulf) sources of distillate fuels. A 20 million barrel Reserve would fully provide for necessary operating volumes while protecting against the complete absence of all Persian Gulf related imports or other situations affecting the loss of half of all imports for a 30 day period.

Estimated Distillate RPR Cost

The cost of establishing an East Coast RPR for distillate fuel has not been examined in some time. Given the downsizing of the refining industry in the Northeast and the reduction in inventory levels in general; however, there should exist adequate facilities available in the private sector that could be utilized for this purpose. Leasing or purchasing these surplus facilities should be considerably more economical than constructing new storage tanks (estimated to cost between $8.80 and $10.50 per barrel in 1989 dollars for crude oil storage by DOE[8]).

A detailed cost/benefit study that examines the use of existing storage capacity as an option should be performed as a preliminary step in developing a comprehensive RPR program.

As mentioned earlier, our Office has preliminarily estimated a direct economic impact from the most recent price spike on New York State alone of approximately $1.12 billion. This figure does not include the longer-range impacts associated with this event, including higher business interest costs and reduced economic output.

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[8]U.S. DOE "Report to the Congress on Expansion of the Strategic Petroleum Reserve to One Billion Barrels," April, 1989, p.35.

Using the figures presented in Table 2, New York State represents 25.8 percent of total Northeast distillate fuel oil demand. As the rest of the region experienced very similar price increases, we can extrapolate a total regional short-term economic impact of $4.35 billion; just from this one event.

It is our belief that the cost of a regional distillate fuel oil reserve should be weighed against the potential financial benefits to Northeast consumers, rather than compared to the expense of expanding crude oil reserves in the Gulf Coast. In this light, we conclude that establishing a Northeast RPR would be money well-spent to protect the consumers of the region from the vagaries of a free-market energy policy.

## CONCLUSION

The rising levels of petroleum consumption since the collapse of the strict OPEC quota system in 1985 and the consequent increase in the nation's dependence on imported sources of oil have served to highlight the strategic importance of the SPR in protecting our economy from a sudden disruption of those supplies.

It is the position of the New York State Energy Office that this rising level of dependence justifies the expansion of the SPR to the one billion barrel level, as originally intended by Congress and envisioned under the legislation at hand.

In recent years, structual changes in the refining, marketing and distribution of petroleum have resulted in lower overall inventory levels and higher refinery capacity utilization and increased the vulnerability of the average consumer and business to unintended supply bottlenecks and distribution accidents. These events expose energy users to unacceptable price increases on a too-frequent basis.

We believe the original goal of establishing regional product reserves for essential fuels in those areas of the country experiencing high levels of import dependence should be acted upon as part of the expansion of the SPR. Due to the interstate nature of the

fuel marketing and distribution system, this is a task not able to be undertaken by an individual state. The Northeast in particular should have access to an RPR containing at least 20 million barrels of distillate fuel oil to ensure that our homes stay warm and our businesses keep running.

The cost of such an RPR may be lower than DOE estimates when compared to the economic dislocations we have already experienced and may be exposed to in the future.

Cambridge Energy Research Associates Inc

# THE STRATEGIC PETROLEUM RESERVE AND U.S. ENERGY SECURITY

**Working Paper**

**COUNCIL ON FOREIGN RELATIONS**

**New York City**

**by Dr. Joseph Stanislaw and Dr. Daniel Yergin**

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# THE STRATEGIC PETROLEUM RESERVE AND U.S. ENERGY SECURITY

By Joseph Stanislaw and Daniel Yergin

## INTRODUCTION

The shift in prospects for the world oil market and renewed concerns about energy security are focusing attention on a big pot of oil that compares favorably in size to a large North Sea oil field. But this particular accumulation is not an oil field created by nature, but rather a man-managed reservoir into which oil is put that has been pumped elsewhere in the world and then transported to South Texas or Louisiana, in order to be put back into the ground. The accumulation in question is the U.S. Strategic Petroleum Reserve (SPR); and what is being scrutinized in the changing political and economic circumstances is the size and operation of the SPR, its utility in a crisis, and indeed its very purpose.

The SPR was established in 1975, in the aftermath of the 1973-1974 oil crisis, in order to provide a buffer against future supply disruptions, whether politically induced or as the result of economic or technical factors. The essential concept is that large amounts of SPR oil pouring into the market would counteract the innate tendency in a crisis to bid feverishly for supplies and to hoard by building inventories. The use of the SPR would eliminate the specter of shortage which is what activates the hoarding instinct. But, at the time of the "Second Oil Shock," which began at the end of 1978 with the collapse of the Shah's regime in Iran, the SPR was still quite small -- only 68 million barrels -- and the ability to "draw down" (withdraw and distribute) the oil was limited. As a result, the SPR played little role, save to be a source of controversy as to whether it should continue to be filled or not during a supply crisis.

At the beginning of 1990, by contrast, the SPR holds 580 million barrels, which is the equivalent of 77 days of net imports, and it is often now described as the "first line of defense" in America's energy security. Those 580 million barrels had been acquired at a cost of $16 billion.

Over the past few years, net U.S. oil imports have been rising quickly, and that, in part, provides the backdrop for the current debate. The current authorization for the SPR runs out shortly, and thus political decisions will be required in the near term on its future. The major controversies regarding the SPR include:

- Size: Current plans call for bringing the SPR up to 750 million barrels by the end of this decade. Since U.S. imports are rising, some argue that the target be raised to one billion barrels.
- Financing: Is the SPR cost effective? Can the SPR be filled through less expensive means than buying barrels outright, such as by "leasing" oil from Saudi Arabia and other exporters?
- Operations: In a crisis, will the SPR operate successfully -- in a physical and logistical sense?
- Activation: Current policy calls for "early release" in a crisis. How would the SPR actually be used? Would it get into the marketplace? How would it interact with the new market mechanisms, such as futures, which have developed since the SPR was first designed? Would there be a major political debate about whether to "release" the oil



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or whether to hold onto it in case events take a turn for the worse, the result of such a debate could be confusion and indecision on the disposition of the SPR?

- Commodity Stockpiles: Some critics argue that the past history of stockpiles offers little ground for confidence in the ultimate effectiveness and efficacy of a program such as the SPR. Others respond that the SPR is meant as a *strategic* reserve not a market buffering reserve.

- Location. The SPR is concentrated on the Gulf Coast. Should there be regional storage facilities, as well?

More than anything else, what is shaping the debate over the SPR are the changes unfolding in the world oil market, and that situation provides the essential backdrop for considering the future of the SPR itself.

**The Oil Market**

The oil crisis of 1973 was the result of a political event -- the Arab oil embargo that accompanied the Yom Kippur War -- superimposed on a very tight world oil market. The "Second Oil Shock," 1978-80, was driven by the disruption of established supply channels, initially centered on Iran, resulting in a global panic. Following that second crisis, oil demand fell significantly around the world, initially the result of the severe recessions of 1980 and 1982 and then, more lastingly, for three additional reasons:

- a great wave of energy conservation;

- large-scale fuel switching, primarily in power generation, from oil to other energy sources, including coal and nuclear power;

- development of more diversified oil production around the world ("non-OPEC"), of which the three most important new sources were the North Sea, Mexico, and Alaska.

In the United States, the decline in oil demand, combined with an increase in domestic U.S. oil production, meant a fall in U.S. oil imports -- from a high of 8.6 million barrels per day (mbd) (46 percent of total consumption) in 1977 to 4.3 mbd in 1985 (27 percent of consumption). The OPEC countries saw their markets fall away, and with that, their share of the world oil market fell from 52 percent in 1977 to 31 percent in 1985. A considerable surplus of production capacity in excess of market demand built up throughout the world, though primarily concentrated in the OPEC countries. This contrasted with the situation in 1973, when the OPEC countries were producing virtually every barrel that they could.

The OPEC countries instituted quotas in order to maintain price. Their market share continued to shrink, particularly that of Saudi Arabia, which saw its production, which had been as high as 10 mbd a few years earlier, fall to as low as 2.5 mbd. In 1985, first Saudi Arabia and then the rest of OPEC shifted from "defending" price to regaining market share. The result was the price collapse of 1986.

Although OPEC quotas were subsequently re-established and the price raised, the price collapse has had enormous consequences. It has changed the economics of the world oil industry concurrent with a long period of economic growth. High-cost oil production has lost its ability to compete in the market. This is most notable in the United States, where oil production has fallen by 17 percent since 1985, a decline of 1.8 mbd. Alaskan output began to decline in 1989 (see Table 1 and Figure 1). U.S. oil imports are back to their late 1970s level and now account for about 45

percent of net imports. Oil production in the North Sea has been disrupted by a series of accidents that appear to be temporary and are now in the process of being remedied. Soviet oil production has also begun to fall, and this drop is beginning to show in reduced Soviet oil exports. Mexican oil production has also fallen by about 9.6 percent since 1984, and that country's oil exports by 17 percent. At the same time, strong economic growth, particularly in East Asia, has been stimulating energy demand and demand for oil.

**Table 1**

**U.S. Petroleum Supply and Demand**
(millions of barrels per day)

| | Crude Oil | | | Net | |
|---|---|---|---|---|---|
| | Lower 48 | Alaska | NGLs | Imports | Demand * |
| 1973 | 9.0 | 0.2 | 1.7 | 6.0 | 17.3 |
| 1974 | 8.6 | 0.2 | 1.7 | 5.9 | 16.7 |
| 1975 | 8.2 | 0.2 | 1.6 | 5.8 | 16.3 |
| 1976 | 8.0 | 0.2 | 1.6 | 7.1 | 17.5 |
| 1977 | 7.8 | 0.5 | 1.6 | 8.6 | 18.4 |
| 1978 | 7.5 | 1.2 | 1.6 | 8.0 | 18.8 |
| 1979 | 7.2 | 1.4 | 1.6 | 8.0 | 18.5 |
| 1980 | 7.0 | 1.6 | 1.6 | 6.4 | 17.1 |
| 1981 | 7.0 | 1.6 | 1.6 | 5.4 | 16.1 |
| 1982 | 7.0 | 1.7 | 1.6 | 4.3 | 15.3 |
| 1983 | 7.0 | 1.7 | 1.6 | 4.3 | 15.2 |
| 1984 | 7.2 | 1.7 | 1.6 | 4.7 | 15.7 |
| 1985 | 7.1 | 1.8 | 1.6 | 4.3 | 15.7 |
| 1986 | 6.8 | 1.9 | 1.6 | 5.4 | 16.3 |
| 1987 | 6.4 | 2.0 | 1.6 | 5.9 | 16.7 |
| 1988 | 6.1 | 2.0 | 1.6 | 6.6 | 17.3 |
| 1989 | 5.8 | 1.9 | 1.5 | 7.1 | 17.2 |

Source: U.S. Department of Energy.
Notes: *Demand includes stock changes, refinery gains and losses, and LPGs.

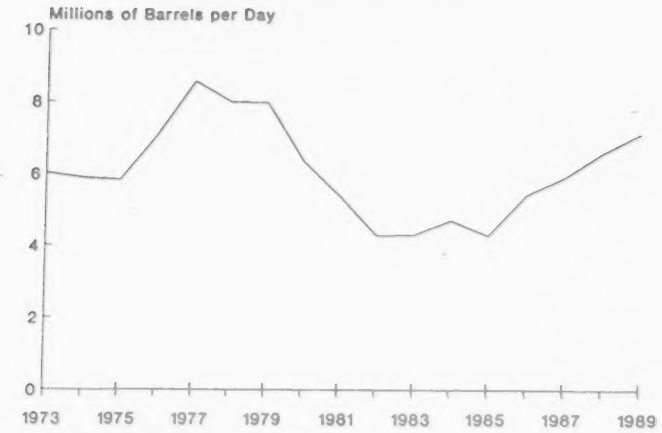
The result has been a shift back to OPEC. The production by that group of exporters has risen from 16.1 mbd in 1985 to 21.7 mbd in 1989 and in excess of 23 mbd today. It is generally thought that OPEC's total production capacity is somewhere between 26 and 28 mbd, having deteriorated over the 1980s. This means that OPEC is currently producing at around 85 percent of its capacity -- more like the situation in the early 1970s than in the mid-1980s (see Figure 2). There is virtually no short-term spare production capacity outside of OPEC. Such a high rate of production does not leave a great "security margin" for accidents and the "unexpected" -- which have become a feature of the world oil market since the beginning of the 1970s -- or indeed for further rises in demand over the next few years.

Five points emerge from these observations:

1. OPEC: Security of Demand. The orientation of most OPEC countries toward their customers, primarily in the U.S. and the other industrial countries, is quite different going into the 1990s than it was going into the 1970s. The emphasis today for the

Figure 1

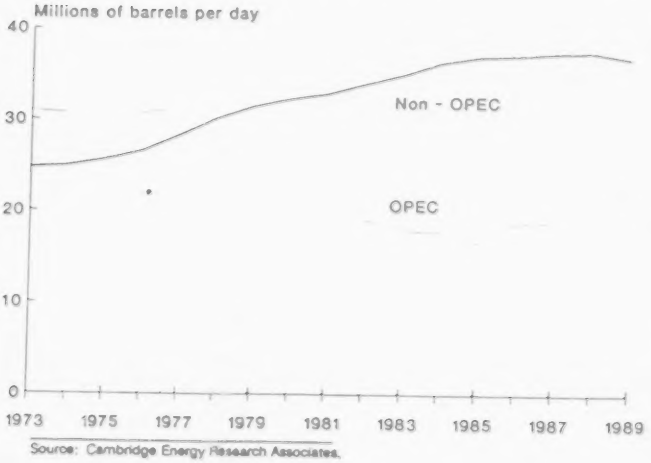
U.S. Petroleum Net Imports




Source: Cambridge Energy Research Associates.

Figure 2

World Crude Oil Production




Source: Cambridge Energy Research Associates.

exporters is on "security of demand" -- long-term markets, where demand will be met by reliable suppliers. The exporters saw their markets shrink before their eyes in the 1980s, and they do not want to repeat that. Thus, a number of exporters currently see their interests best served by "moderate," rather than high prices.

2. The Market: Accident Prone. A tight market, however, is one vulnerable to shocks. Customarily one looks at the Middle East for such shocks, but they could arise elsewhere as well, such as a perturbation in Soviet oil production or a serious environmental problem. The market is also exposed to short-term volatility due to unexpected incidents and accidents at oil production facilities worldwide. The market response to a problem could well be a sharp price spike, and such a response could come more swiftly than in the 1970s, because of changes in the structure of the market. Indeed, the spike in heating oil prices this past winter demonstrates how the weather can, at least in the short term, trigger a sharp response in the market price.

3. Market-Driven Risk Management. Owing, among other reasons, to the pressure of financial and energy markets over the past few years, the various stages of the energy supply markets are more taut, with less cushion, and thus "management" of risk may end up more in the marketplace and less within companies.

4. Price and Conservation. Future prices and the expectation thereof will have effects on demand, though the timing and extent is uncertain. A decade ago, it was obvious that there was tremendous conservation potential, for instance, in the United States. Today, the United States uses 22 percent less energy per dollar of GNP than it did in 1979, and 29 percent less than 1973. The extent of the readily-available conservation potential in the industrial countries is less clear today, and many developing countries are at a stage where rising incomes means rising energy consumption.

5. The Production Capacity Race. Growing demand and rising prices will elicit a supply response, both from non-OPEC producers and, critically, from OPEC countries. Over the past few months eyes have turned to the subject of capacity additions in the OPEC countries. There is now much discussion about adding of new production capacity. But there are many questions. Who will add that capacity? Who will pay for it? How will it be paid for? And when? Timing is a critical question. Capacity increases in at least nine of the OPEC countries could total as much as 5 to 6 mbd by the mid-1990s. In a very real sense, the most important driving force in the world oil markets during the 1990s may be the race between OPEC production and OPEC capacity.

In a tightening market, the salience of the SPR increases and its significance and importance to U.S. interests increases.

### Of Stockpiles and Storage

The strategic danger of a disruption of oil supplies first became apparent on the eve of World War I, when Winston Churchill as First Lord of the Admiralty, converted the Royal Navy from coal to oil. This was the first of many occasions when a government of an oil-importing country pursued policies of building up strategic reserves -- that is, oil in government-owned or government-controlled storage that could be used in an emergency. There has always been, as there is today, the question of how much is enough. Marcus Samuel, the founder of Shell Transport and Trading and a leading proponent of Churchill's decision to convert to oil, argued, "You cannot have too much storage -- I do not think you can go too far in that." Budget-conscious treasury departments usually tend to disagree. The nature of vulnerability was, however, brought home during the First World War, in 1917, when the entire British and French military operations were threatened by a serious oil shortage, resulting from German interdiction of shipments from

the United States to Europe through submarine warfare. In the interwar years, as oil became more crucial to the efficacious use of military force, various governments pursued programs in an attempt to build up strategic stocks. Any such concerns faded, however, in the United States during the 1930s, owing to the glut arising from the great discoveries in East Texas and elsewhere.[1]

World War II led to renewed attention on ensuring sufficient supplies in time of a crisis. This was part of a larger focus on import dependence for critical raw materials. The first stockpile legislation (for minerals) in the United States was passed in 1939.[2] In the years immediately following World War II, some proposed a conscious policy to increase petroleum imports from the Middle East in order to maintain a strategic reserve of unused production capacity in the Western Hemisphere that could be used in a crisis. In 1948, the U.S. National Security Resources Board argued that the U.S. should step up imports of Middle Eastern oil in order to allow a million barrels per day of Western Hemisphere production to be shut in, in effect creating a military stockpile in the ground -- "the ideal storage place for petroleum," it said. In its review of commodity policies, the Paley Commission recommended in 1952 the establishment of a strategic reserve for oil. After the 1956 Suez Crisis, President Eisenhower suggested that the U.S. government build up its own emergency oil reserves. The idea was considered wholly impractical. A similar recommendation was made by the Cabinet Task Force on Oil Import Control, chaired by George Shultz, in 1970, though without effect. At about the same time, the Shah of Iran -- keen to increase his country's output and thus its revenues -- offered to provide the United States with a million barrels per day for 10 years, at a dollar per barrel, that could be stored in salt domes. The United States did not accept the offer.[3]

But, in fact, the United States did already have a "strategic reserve." This was the production capacity "shut-in" by the Texas Railroad Commission and similar agencies in other states. It was not shut-in for strategic reason but rather, officially on grounds of "conservation," with the *de facto* effect of maintaining higher prices for domestically produced oil. In the series of postwar oil crises -- 1951, 1956, 1967 -- this "shut-in" production was called into operation, and provided the critical alternative supplies that muffled the crises (see Table 2). But, by the beginning of the 1970s, there was no longer any shut-in capacity in the United States; the country's oil industry was producing flat-out. The United States reached its historic peak as an oil producer in 1970 and then began to decline; the old quota system broke down; and the U.S. became increasingly dependent upon imported oil. What this meant was that the "security margin," which had been instrumental in managing previous crises, was no longer there.[4]

In essence, today the Strategic Petroleum Reserve is meant to assume the place formerly held by the shut-in production capacity in the United States and so provide what is perceived to be the requisite security margin.

### The Establishment of the SPR

Provision for the SPR was contained in the Energy Policy and Conservation Act (EPCA), which was signed into law in December 1975. (This was the same legislation that provided for the automobile fuel efficiency standards.) The declared objective was to establish the reserve in order to reduce the effect of disruptions in petroleum supplies and to carry out the obligations of the

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[1]Daniel Yergin, *The Prize: The Epic Quest for Oil, Money, and Power*, (New York: Simon and Schuster, 1990).
[2]Raymond Vernon, *Two Hungry Giants: the United States and Japan in the Quest for Ore and Oils*, (Cambridge: Harvard University Press, 1983).
[3]Daniel Yergin, *The Prize*.
[4]Daniel Yergin, "Energy Security for the 1990s," *Foreign Affairs*, Autumn 1988.

**Table 2**

**World Oil Supply Disruptions**
**Percent of World Oil Consumption**
**1951-1989**

| Dates | Supply Disruption | Magnitude of Supply Shortfall (mmb/d) | World Oil Consumption (mmb/d) | Percent of Consumption |
|---|---|---|---|---|
| March 1951-October 1954 | Iranian Fields Nationalized | 0.7 | 13.22 | 5.30 |
| November 1956-March 1957 | Suez War | 2.0 | 17.5 | 11.43 |
| December 1966-March 1967 | Syrian Transit Fee Dispute | 0.7 | 34.3 | 2.04 |
| June 1967-August 1967 | Six Day War | 2.0 | 40.0 | 5.00 |
| July 1967-October 1968 | Nigerian Civil War | 0.5 | 40.1 | 1.25 |
| May 1970-January 1971 | Libyan Price Controversy | 1.3 | 48.0 | 2.71 |
| April 1971-August 1971 | Algerian-French Nationalization Struggle | 0.6 | 50.2 | 1.20 |
| March 1973-May 1973 | Lebanese Political Conflict | 0.5 | 58.2 | 0.86 |
| October 1973-March 1974 | October Arab-Israeli War | 1.6 | 58.2 | 2.75 |
| April 1976-May 1976 | Civil War in Lebanon | 0.3 | 60.2 | 0.50 |
| May 1977 | Damage at Saudi Oilfield | 0.7 | 62.1 | 1.13 |
| November 1978-April 1979 | Iranian Revolution | 3.7 | 65.1 | 5.68 |
| October 1980-January 1981 | Outbreak of Iran-Iraq War | 3.0 | 60.4 | 4.97 |
| July 1988-November 1989 | UK Piper Alpha Offshore Platform Explosion | 0.3 | 49.8 | 0.60 |
| December 1988-March 1989 | UK Fulmer Floating Storage Vessel Accident | 0.2 | 51.6 | 0.39 |
| April 1989-June 1989 | UK Cormorant Offshore Platform | 0.5 | 51.6 | 0.97 |

Source: U.S. Department of Energy

United States under the agreement among the western nations on an International Energy Program (IEP).

The IEP was signed as part of the U.S. membership in the International Energy Agency (IEA). The IEA is a semi-autonomous organization, related to the Organization for Economic Cooperation and Development (OECD). Its purpose is to help coordinate energy policies and positions of the western industrial countries, promote energy security broadly-defined, and prevent destructive mercantalist policies among member nations. Among other things, the IEA provides a framework for coordinating emergency stock programs among western countries. The IEA has repeatedly emphasized the role of oil stocks (i.e., inventories). For instance, its 1984 "Decision on Stocks and Supply Disruptions," stressed the role of emergency oil stocks in offsetting short-term supply disruptions, moderating the resulting price increases, and mitigating economic damage. This commitment has been reiterated by the IEA Governing Boards -- at the ministerial level -- in 1985, 1987, and 1989.

In essence, five dominant perceptions have shaped policy on stocks among the western industrial countries:

- Disruptions can reoccur.
- Disruptions can cause serious disorder in national economies and societies and engender grave tensions within societies and among the western countries.
- Disruptions, combined with sudden price increases, can cause serious and even grave macroeconomic difficulties, measured in terms of inflation and recession.
- Disruptions or shortages can have negative military implications.
- The possibility or actuality of disruption and manipulation of oil supplies for political purposes can put western countries into unacceptable foreign policy positions.

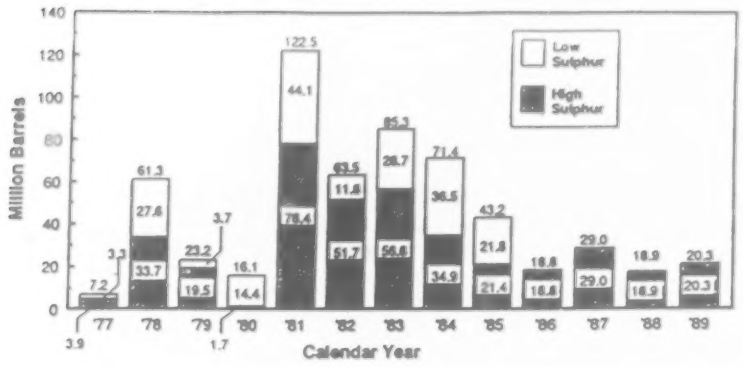
Thus, emergency stocks like the SPR are meant to help manage and reduce the effects of such risks -- and, indeed, to serve as a deterrent.

The IEA's commitment is for countries to maintain, in one form or another within their borders, the equivalent of 90 days of the previous year's net imports in the form of oil stocks. This can be any mixture of company stocks, government-controlled stocks, or government-owned stocks. In many countries, there are mandatory requirements for oil companies to maintain specific levels of stocks. This is not the case in the United States. In addition to the United States, only Japan and Germany have substantial government-owned and operated strategic petroleum reserves. Nevertheless, several other West European countries maintain relatively high levels of inventories when measured in terms of days of net oil imports. Altogether, the United States has about 200 days of imports coverage from the SPR and commercial stocks combined. However, 75 to 90 percent of the commercial stocks are considered essential to keep the far-flung U.S. oil supply system functioning (see Appendix Tables 1, 2, and 3).

In the course of establishing the U.S. SPR, salt domes were identified as the preferred setting for storage. The logical choice for such storage was along the U.S. Gulf Coast, where more than 500 salt domes are located, and it is also the logistical center for tankers, barges, pipelines, refineries, and distribution points. Acquisition of the first storage sites began in Louisiana and Texas in 1977, and in that year the "fill" began (see Figures 3 and 4).

Figure 3

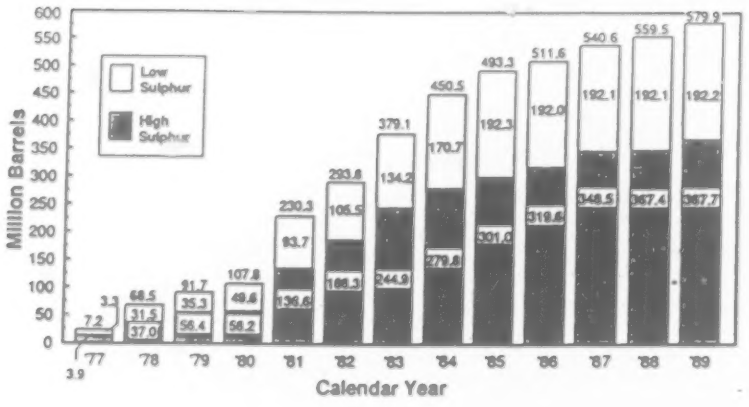
Annual Strategic Petroleum Reserve Oil Fill




Source: U.S. Department of Energy

Figure 4

Cumulative Strategic Petroleum Reserve Oil Fill




Source: U.S. Department of Energy

### Current Policy

In accord with current law and policy, the Department of Energy (DOE) is developing the Strategic Petroleum Reserve with the following characteristics:

- The U.S. government owns, controls, and manages the SPR facilities and the oil inventory.
- Crude oil is the commodity stored. The technical specifications are in accord with those of U.S. refiners.
- The crude oil is acquired through market-like methods, which have included a mix of short-term contracts with prices reflecting market conditions.
- The inventory is to be stored in salt caverns at six sites in Louisiana and Texas, connected by DOE-owned pipelines to the commercial crude oil distribution system.
- The SPR is financed through the normal Federal budget process, with the DOE doing the budgeting. To the extent that debt proceeds, rather than taxes or other current income, are used to finance the Reserve's costs, the Treasury Department arranges for the sale and servicing of the debt; interest costs on this debt are reflected in appropriations to the Treasury Department.
- The President is authorized to decide whether, how, and when the SPR inventory is to be sold, under the broad criteria in the EPCA and as amended.
- The Secretary of Energy, through an "SPR Plan" -- which includes a distribution plan and which is transmitted to Congress -- prescribes the mode of storage and drawdown.
- Under current plans, the primary method for distributing the SPR is through competitive sales.
- The SPR inventory target is currently set at 750 million barrels.

### How Is the SPR Organized?

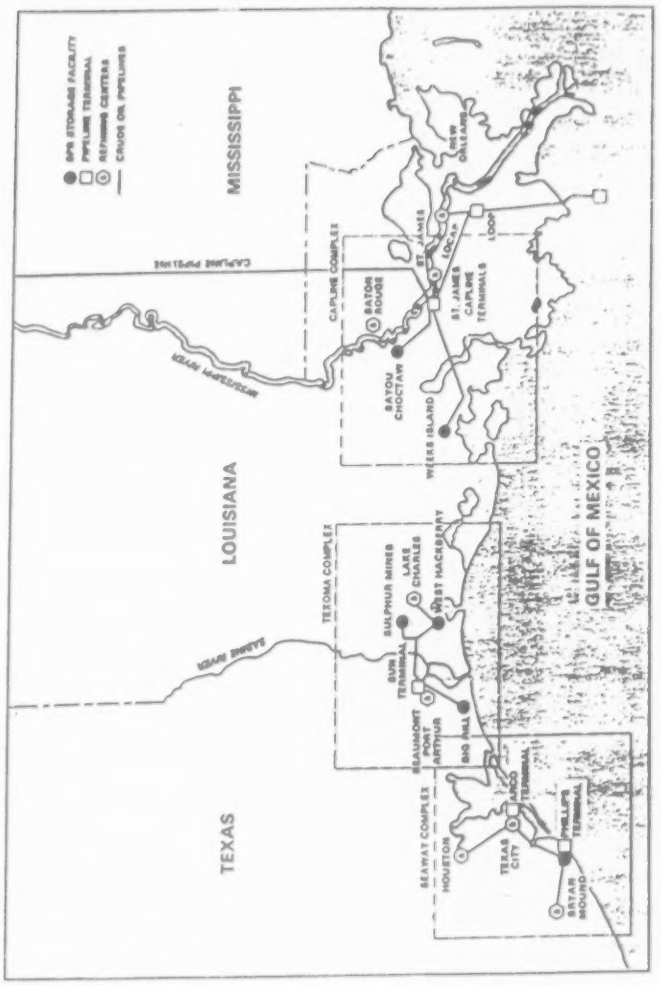
The system is composed of six underground crude oil storage facilities in salt domes along the Gulf Coast, plus a government-owned marine terminal on the Mississippi River at St. James, Louisiana (see Figure 5). These six sites are organized into three distribution systems and are connected by DOE pipelines to commercial crude oil pipeline networks and government-owned marine terminal distribution centers. Of the total stockpile, 67 percent is high sulfur (sour) and 33 percent is low sulfur (sweet).

How much oil could be withdrawn from the system today? The current drawdown and distribution capability is 3.5 mbd (see Figure 6). This is roughly equivalent to 40 to 45 percent of current import levels. After 90 days, the drawdown rates would decrease gradually as various site inventories deplete and a declining number of remaining caverns containing crude oil become a constraint on the sites' drawdown rates.

The current program is aimed to raise the storage from its 580 million barrels at the beginning of 1990 to 750 million barrels and the drawdown/distribution capability to 4 mbd.

Figure 5

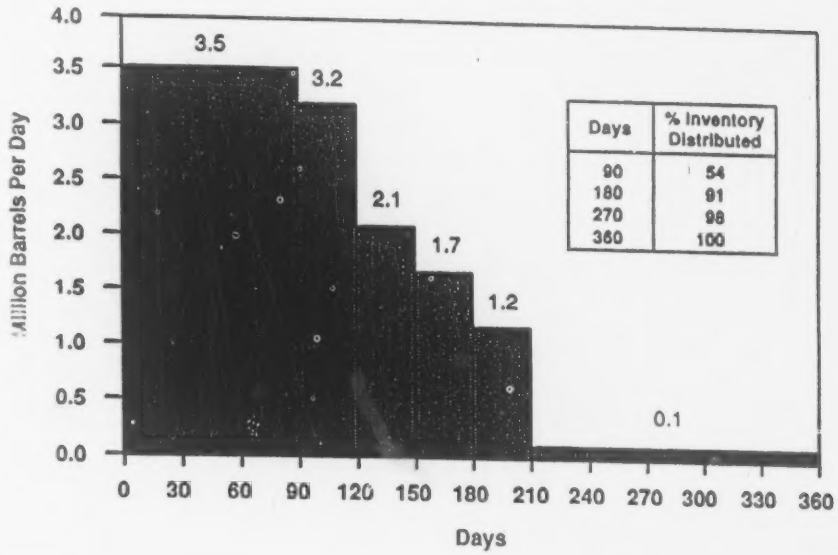
Strategic Petroleum Reserve Complexes and Associated Pipelines and Terminals




Source: U.S. Department of Energy

Figure 6

Strategic Petroleum Reserve Drawdown/Distribution Capability Inventory as of 12/31/89




Source: U.S. Department of Energy.

**And What Does It Cost?**

Table 3 and Figures 7 and 8 show the SPR appropriations from 1976 through 1990, totalling $19.7 billion. These appropriations are broken down into three categories:

1) Petroleum acquisition and transportation -- $16.2 billion (of which $15.8 billion was for oil and the rest for transportation).

2) Storage facilities development and operation -- $3.2 billion.

3) Management -- $235 million.

Future costs, of course, will depend on future decisions about the size, fill rate, and financing alternatives -- and the oil price itself. Under current projected budgets and plans, the 750 million barrel target would be achieved by mid-1999 (with fill rates of 39,0000 barrels per day in fiscal year (FY) 1990, 59,000 barrels per day in FY 1991, and 50,000 barrels per day thereafter). Under the FY 1991 budget request, the estimated total cost by 1999 for the development, operation, and management of the reserve is $5.1 billion. Based upon the oil price scenario used in the FY 1991 budget request, the additional oil would cost $19.5 billion.

**Where and How is the Oil Acquired?**

The crude oil in the SPR comes from foreign and domestic sources. The SPR has acquired crude oil from:

- purchases on the international spot market;
- long-term (one year or longer) contracts with domestic and foreign suppliers;
- special sales arrangements for oil from government-owned oil fields.

About 40 percent of the current supplies in the SPR has been purchased from Mexico. This includes a one billion dollar advance payment purchase made as part of the emergency rescue program for Mexico in 1982 when that country teetered on bankruptcy and loan default. Most of the Mexican oil has been purchased, however, on one to two year contracts, typically calling for 50,000 to 65,000 barrels per day. Prices for each delivery are based on a composite of prices for several domestic crude and heating oils.

**Drawdown and Distribution**

Drawdown relies on the fact that crude oil floats on top of water. To withdraw oil from a storage cavern, site operators would inject fresh water into the cavern, forcing the crude out of the top of the cavern and through piping to the surface. After passing through metering stations, the oil would be transported by pipelines to terminals, which in turn are tied into the nation's commercial oil transport network. From that point, the oil would either go by pipelines to local refineries or loaded into tankers and barges for transportation to other parts of the country.

But will this system work? As part of the SPR's development, there is frequent testing of equipment and personnel to ensure that the SPR is in a constant state of readiness. Drawdown tests are run at all sites to ensure that oil can be withdrawn from the storage caverns. The first test was conducted at the West Hackberry site in February 1980. Since 1983, actual or simulated drawdown tests have been conducted regularly at different SPR sites. The equipment tests have



29-532 0 - 90 - 8

**Table 3**

**Strategic Petroleum Reserve Appropriations**
(thousands of dollars)

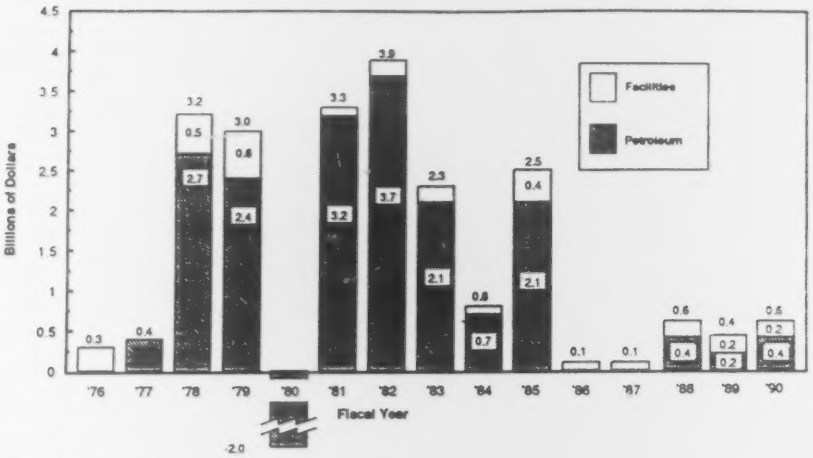
| Fiscal Year | Petroleum Acquisition and Transportation | Storage Facilities Development and Operations | Management[1] | Total |
|---|---|---|---|---|
| 1976 | 0 | 300,000 | 13,975 | 313,975 |
| 1977 | 440,000 | 0 | 7,824 | 447,824 |
| 1978 | 2,703,469 | 463,933 | 14,704 | 3,182,106 |
| 1979 | 2,885,670 | 193,290 | 18,111 | 3,097,071 |
| Reprogramming | (529,214) | 529,214 | 0 | 0 |
| | 2,356,456 | 632,504 | 18,111 | 3,097,071 |
| 1980 | (2,000,000)[2] | 0 | 0 | (2,000,000) |
| Reprogrammings: | | | | |
| Number 1 | (20,391) | 0 | 20,391 | 0 |
| Number 2 | (1,881) | 0 | 1,881 | 0 |
| | (2,022,272) | 0 | (22,272) | (2,000,000) |
| 1981 | 2,686,282[3] | 82,834 | 19,391 | 2,790,507 |
| Entitlements | 542,146 | 0 | 0 | 542,146 |
| Reprogrammings: | | | | |
| Number 1 | (18,000) | 18,000 | 0 | 0 |
| Number 2 | (7,334) | 7,334 | 0 | 0 |
| | 3,205,094 | 108,168 | 19,391 | 3,332,653 |
| 1982 | 3,684,000 | 171,356 | 20,076 | 3,875,432 |
| Reprogramming | (4,300) | 4,300 | 0 | 0 |
| | 3,679,700 | 175,656 | 20,076 | 3,875,432 |
| 1983 | 2,074,060 | 222,528 | 19,590 | 2,316,178 |
| 1984 | 650,000 | 142,357 | 16,413 | 808,770 |
| 1985 | 2,049,350 | 441,300[4] | 17,890[4] | 2,508,740 |
| 1986 | 0 | 94,015 | 13,518 | 107,533 |
| Reprogramming | (12,964) | 12,964 | 0 | 0 |
| | (12,964) | 106,979 | 13,518 | 107,533 |
| 1987 | 0 | 134,021 | 13,412 | 147,433 |
| 1988 | 438,744 | 151,886 | 12,276 | 602,906 |
| 1989 | 242,000 | 160,021 | 13,400 | 415,421 |
| 1990 | 437,147 | 179,530 | 12,953 | 629,630 |
| **Total Appropriations** | **$16,240,984** | **$3,218,883** | **$235,805** | **$19,694,672** |

Source: U.S. Department of Energy.
Notes: [1]Excludes funds appropriated to other DOE accounts but used to finance aspects of SPR program management.
[2]Rescission.
[3]Included supplemental appropriations of $1,305,000,000.
[4]Included in FY 1984 second supplemental appropriations.
[5]Includes indefinite appropriation estimated at $120,000,000.

Figure 7

**Strategic Petroleum Reserve Annual Funding**

Storage Facilities Development/Operations and Petroleum Acquisition/Transportation

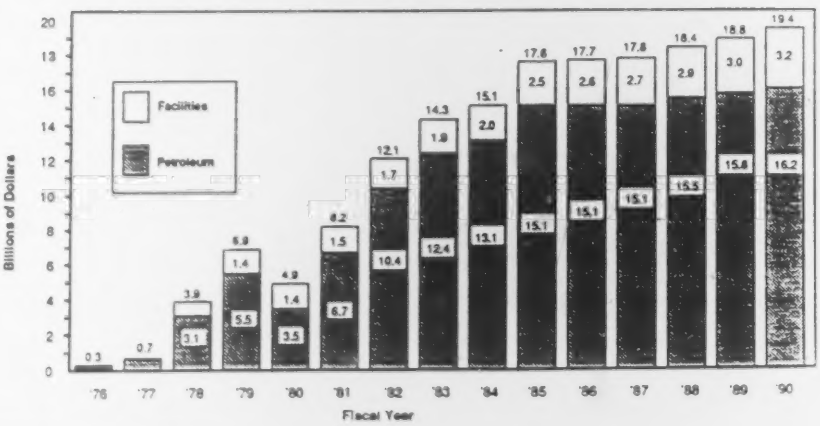



Source: U.S. Department of Energy.

Figure 8

**Strategic Petroleum Reserve Cumulative Funding**

Storage Facilities Development/Operations and Petroleum Acquisition/Transportation




Source: U.S. Department of Energy.

included the transport of oil to terminals. Some have involved simultaneous drawdowns at different sites. Others have included planned power failures to ensure that the system can operate on backup diesel-powered pumps.

Tests of the bidding and distribution system have also been conducted. While most have simulated the sales process, in 1985 and 1986 DOE carried out an actual test sales of SPR oil to private purchasers. One million barrels of crude oil were sold in the test.

**And What Would Happen?**

Drawdown decisions have to be based on a host of judgments -- including the probable length of a disruption, the likelihood of subsequent disruptions, and whether there would be opportunities to refill between disruptions. The decision can also be directed towards a variety of objectives, such as to:

- supplement domestic oil supplies and thus reduce economic and social costs;
- enhance or augment national security or foreign policy goals;
- assist in meeting IEP and other commitments.

The governing legislation provides that use of the SPR cannot be made unless the President finds such actions are required due to "a severe energy supply interruption or by obligations of the U.S. under the International Energy Program." In turn, a "severe energy supply interruption" is defined as a national energy supply shortage that:

- is or could be of significant scope and duration and of an emergency nature;
- could cause major adverse impacts on national safety or the national economy;
- results from a interruption in the supply of import petroleum products, or from sabotage, or an act of God.

The International Energy Program includes a provision under which, in an emergency, a sharing of available supplies would be worked out among the IEP member countries. The existence of these IEP obligations can serve as basis for authorizing an SPR drawdown, but there is no obligation to use the SPR specifically to meet any international sharing obligations.

The principal method of distribution of SPR oil is meant to be price-competitive sales, with the oil going to the highest bidder, and with the sales open to all interested buyers. However, the Secretary of Energy can direct sales to specific buyers up to 10 percent of total SPR oil sold during any given month.

Only the President can actually authorize a drawdown. But the general policy is "early release" -- that is, to get the supplies out into the market early on in a crisis, or even in anticipation of a crisis before it actually occurs ("early release" has also been accepted by Germany and Japan). The sales process in the United States itself involves four primary steps:

- issuance of notice of sale;
- receipt of bids:
- selection of successful bidders;

- delivery of oil.

It is thought that a sales cycle, running from Presidential authorization to the start of oil delivery, can be accomplished within three weeks.

**Principal Issues of Discussion**

*(A) Size*

With rising imports, the number of days of forward cover has been declining (see Figure 9). In the current reauthorization period, the leading issue of debate concerns the size of the SPR. The Administration's position is that 750 million barrels is the appropriate target; others say that one billion barrels is a more appropriate objective. This was a major subject of discussion in hearings held before the Senate Energy Committee on March 20, 1990.

Robert H. Gentile, Assistant Secretary of Energy for Fossil Fuel, summarized the results of a new study by a U.S. government Interagency Working Group on "size options" for the SPR. Mr. Gentile made the following points:

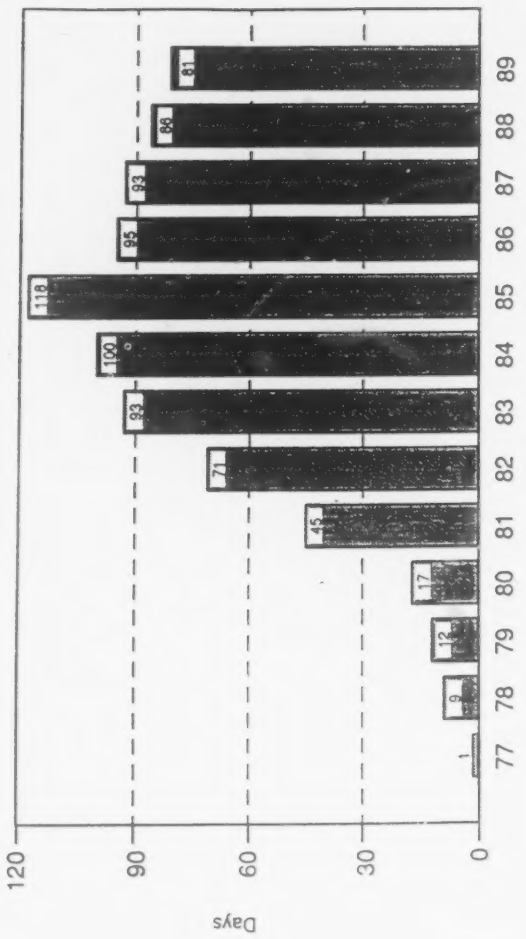
> "The Administration believes that the development of a 750 million barrel SPR is an appropriate and prudent oil stockpiling policy for the United States. . . . The United States possesses the world's largest government-owned petroleum stockpile. The SPR is also one of the largest direct investments by the federal government in the energy sector, and serves both as a powerful deterrent against oil supply disruptions and as an effective instrument to minimize damage to the economy if such disruptions should occur. The question before the Congress and the Administration, therefore, is not one of whether to have a large SPR; we have one. Rather, the question is whether expanding the SPR beyond 750 million barrels is necessary or justified...
>
> "Expansion beyond the 750 million barrel goal would be inconsistent with current understanding of market and geopolitical conditions and of their evolution during the last decade. Such an expansion would also require a diversion of public spending from other DOE programs that also enhance United States energy security . . . It would also aggravate budgetary constraints, increase U.S. oil imports (purchases of SPR oil) that add to trade imbalances, and possibly serve as a disincentive to the expansion of strategic reserves held by our allies...
>
> ". . . expansion of the Reserve beyond the planned level of 750 million barrels is neither cost effective nor likely to measurably affect United States energy security. A key finding of the size study is that the incremental benefits of increasing the SPR from 750 million barrels to one billion barrels are far outweighed by the additional costs . . . The coordinated use of (IEA member states strategic stockpiles) would provide protection against a range of worst-case disruptions of a magnitude significantly greater than any disruption experienced in the last 40 years.
>
> "Today, we are substantially better prepared to deal with an oil supply interruption than we were in 1979. By the end of 1990, there will be the potential to offset, for six months, a loss of between 8 and 13 million barrels per day of oil supply, or a maximum of 25 percent of Free World oil consumption, assuming all excess capacity, including that in the Middle East, is used. The U.S. SPR alone will provide the capability to offset, barrel for barrel, and for six months, an interruption of 3 million barrels per day. IEA government controlled stocks would add, if necessary, an additional minimum of 2 million barrels per day. Fuel switching and potential incremental supplies from excess

Figure 9

**Days of Net Import Protection**

SPR Inventory (Year End)

Net Petroleum Imports (Year Avg.)




Source: U.S. Department of Energy

world production capacity would provide offsets of between 4 and 7 million barrels of oil."[5]

At the same hearings, Philip K. Verleger, a Visiting Fellow at the Institute for International Economics, offered a critique of the interagency study. He said that it is unrealistic to expect that "world supplies can be cut by a full 20 percent without having any impact on oil prices," and that in oil market disruptions, "oil exporting countries having surplus capacity immediately increase production to replace lost supplies at the predisruption price. These Santa Clauses are aided by other holders of stocks so that the oil in the strategic reserve can be used last." Verleger also argued that "changes in the structure of world oil markets will have [major effects] on the market during the next crisis. These changes, . . . the 'commodization' of the oil market, require that consuming governments hold larger stocks and be ready to use them more rapidly."

Verleger cites the sharp gasoline price increases following "the very minor interruption in supply associated with the Exxon Valdez incident" and the doubling of heating oil prices this past winter. "These two episodes contain a lesson for energy planners. Prices should be expected to increase rapidly at the outset of a crisis, not remain at predisruption levels as predicted by the Working Group. Further, prices will remain high until the lost supply is restored. Evidence from other markets indicates that these increases will occur even if the level of supply is maintained at predisruption levels because expectations of buyers and sellers are fundamentally changed by the event that triggers the crisis." Thus, he says, there is a need to be prepared "to meet the psychological " as well as "physical effect of a crisis. This would require the agency plan to use the Strategic Reserve first and agree to supply oil in sufficient volumes to offset both the loss of supply and the increased demand for stocks. In short, DOE must plan to flood the market with oil if it is going to prevent prices from increasing."[6]

*(B) Cost*

Various proposals have been put forward for SPR financing, including the addition of a small "user's fee" in the form of an addition to the current gasoline tax. Recently, however, attention has centered on lowering the acquisition cost for the SPR by leasing, rather than buying oil. The idea is that the United States would "lease" or "rent" oil from a country like Saudi Arabia that has surplus capacity. To be effective, the U.S. would be leasing the oil at below market rates. It might or might not acquire ownership at the end of the period. In the meantime, however, the U.S. government would have complete control over disposition of the leased oil in the reserve. The advantages for the exporting country are two-fold: it would be gaining additional revenues that, otherwise, it would not be receiving; and the act of leasing would demonstrate the particular country's intention to be a reliable supplier and its opposition to sudden and destabilizing price increases and shocks.

Under one proposal, the United States would be leasing oil from a producer at an annual fee of, say, 5 percent of the current market value -- which, at $20 per barrel, works out at $1 per year. Subsequent payment would only be made when and if the leased oil was actually used by the United States.

---

[5]Robert H. Gentile, Statement before the Committee on Energy and Natural Resources, U.S. Senate, March 20, 1990.

[6]Philip K. Verleger, Statement before the Committee on Energy and Natural Resources, U.S. Senate, March 20, 1990.

*(C) Other Pro's*

Several other arguments are advanced *in support* of the SPR:

- It provides foreign policy flexibility in reacting to events affecting world oil supplies. The SPR buffer buys time for U.S. policymakers to pursue measured options as opposed to being forced to more severe reactions.
- The existence of the SPR serves as a deterrent to any producers considering political/economic actions that would deny supplies to the world market: those producers would pay a price -- foregone sales revenue.
- A large and effective SPR tends to counteract calls for protectionist measures for domestic energy production.
- The SPR can influence market psychology and tend to be a stabilizing force during an oil supply interruption. An announcement by the President or Secretary of Energy that the SPR will be used promptly and at a high rate could have a calming effect on a volatile market and, in particular, would make would-be hoarders think twice about the economic consequence of their adding to their own inventories and would warn off speculators.

*(D) Con's*

One further argument relates to a change in the behavior of oil companies. They have progressively lowered their own holdings. This is the result of several factors:

- Market conditions, combined with the pressure of the financial markets for quarterly performance, have caused companies to cut inventories in order to reduce costs.
- Price volatility has meant that companies want to avoid inventory risks.
- Companies have increasingly sought to cover their market risk with futures instead of physical inventories.

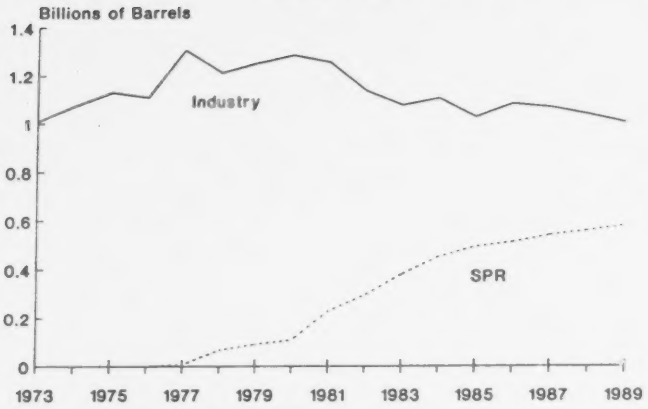
Thus, there is less cushion in private inventories in a supply crunch, and more of a need for the SPR (see Figure 10).

There are also several additional arguments *against* the SPR and questions about how it would work.

One centers on the character of the American political system. The declared policy is one of "early release." But some believe that, in real life, there would be a fractious and angry policy debate involving the "early releasers" in conflict with the "doubters," who question the reality of a crisis and suspect oil company manipulation, and the "hoarders," who, uncertain as to what is ahead, want to hold onto the oil in the reserve. The result might well be indecision, delay, and confusion, with the result that the SPR would be used too late to be effective, if used at all. And one can certainly conceive of situations where market conditions result in price spiking, prompting calls for use of the SPR by some, while others say that the market will correct itself. However, the general view in the U.S. (and other Western governments), is that the SPR is for *strategic* purposes, and not a *buffer stock* for smoothing out price fluctuations -- the experience of which with other commodities has been poor.

**Figure 10**

**U.S. Primary Petroleum Stocks**
Year End Inventories




Source: Cambridge Energy Research Associates.

Others believe that the general record of commodity stockpiles is not very encouraging. Whatever the intent of the SPR, they say, there has been a chronic confusion concerning stockpiles as to whether the purpose of the stockpile is strategic or to serve as a buffer and stabilizing mechanism, or whether they really end up as a way to subsidize certain producers. They are concerned that this could end up the fate of the SPR.

It is also argued that the current oil market structure makes the SPR in its current configuration and use policy largely irrelevant and somewhat obsolete. With the existence of the futures and futures markets, the dominance of market-related pricing contracts, and the large number of wholesalers and distributors, the market would react too quickly and prices would rise too sharply for the SPR to have its intended effect. In other words, it would end up being too little, too late. In addition, it is said in support of this position that even if SPR supplies were sold quickly, there is no mechanism for assuring they would actually reach end-users. During a real or perceived supply interruption, inventories might be husbanded because of rising price expectations. So SPR oil might just go from salt domes into steel tanks.

Finally, there is a broad macroeconomic debate that underlies some discussion of the SPR. For the most part, it is believed that the two oil crises of the 1970s delivered grave macroeconomic shocks, as measured in inflation and recession, and that therefore a driving reason for such energy security measures as the SPR is to prevent future economic shocks. The SPR is, in effect, an insurance premium on the gross national product. And, since the house has already been burned down twice in recent times, there is good reason to keep up the premium. A minority view, however, holds that the problems of the 1970s were not the result of the oil shocks but rather of poor monetary policy; and that, therefore, if the management of monetary policy and economic policy in general is improved, there is little likelihood of a new shock. That being the case, greater

effort should be put into improving the competence of economic management rather than into the building up of a Strategic Petroleum Reserve.

### New Calculus

One fact is central. A substantial SPR now exists, which was not the case a decade ago, and it adds a new and more explicit meaning to the concept of the security margin and establishes a new calculus for considering the dynamics of crises that lie ahead.

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APPENDIX 1

**Stocks on Land in IEA Countries**
**as of July 1, 1989**
(million of barrels or "days")

| Country | Company Stocks | Strategic (Public) Stocks | MOR* | Total Access Stocks | Days 88 Net Imports |
|---|---|---|---|---|---|
| Australia | 34 | 0 | 18 | 16 | ** |
| Austria | 16 | 3 | 4 | 15 | 94 |
| Belgium | 34 | 0 | 12 | 21 | 88 |
| Canada | 115 | 0 | 86 | 29 | ** |
| Denmark | 22 | 13 | 7 | 28 | 373 |
| Germany | 93 | 191 | 83 | 200 | 126 |
| Greece | 33 | 0 | 11 | 22 | 146 |
| Ireland | 6 | 0 | 2 | 4 | 76 |
| Italy | 149 | 6 | 58 | 97 | 101 |
| Japan | 355 | 188 | 157 | 385 | 119 |
| Luxembourg | 2 | 0 | 1 | 1 | 77 |
| Netherlands | 40 | 15 | 35 | 20 | 192 |
| New Zealand | 7 | 0 | 4 | 3 | 187 |
| Norway | 26 | 0 | 8 | 18 | ** |
| Portugal | 20 | 0 | 9 | 12 | 109 |
| Spain | 59 | 0 | 37 | 22 | 74 |
| Sweden | 43 | 1 | 7 | 37 | 141 |
| Switzerland | 39 | 0 | 4 | 36 | 147 |
| Turkey | 19 | 0 | 9 | 10 | 47 |
| U.K. | 120 | 0 | 61 | 59 | ** |
| U.S. | 842 | 565 | 393 | 715 | 209 |
| **IEA Total** | **2,074** | **981** | | **1,749** | |
| France | 123 | 0 | 18 | 55 | |

Source: International Energy Agency.
Notes: *Minimum Operating Requirements.
**Net exporter or very small net importer.

**APPENDIX 2**

**Stock Ownership and Custody**

| Country | Ownership | Custody |
|---|---|---|
| Japan | Federal reserve - government (JNOC) | JNOC – in segregated tankage |
| | Compulsory stocks – Companies | Amalgamated with commercial stocks |
| W. Germany | Federal reserve – government | Government – in segregated salt domes |
| | Compulsory stocks – Mixed<br>• EBV owns most of its stocks<br>• Companies retain ownership of some EBV stocks as well as of balance of compulsory stocks | Mixed – EBV stocks are generally held in segregated storage (tanks and salt domes). Some of the EBV stocks as well as the compulsory stocks held by companies themselves are generally amalgamated with commercial stocks |
| France | Compulsory stocks – Mixed<br>SAGESS owns some stocks and leases others<br>• Companies retain ownership of leased stocks as well as of balance of compulsory stocks | Mixed – SAGESS leases tankage from companies; stocks are not necessarily segregated but may be amalgamated with commercial stocks |
| United Kingdom | Compulsory stocks – Companies | Amalgamated with commercial stocks |
| Netherlands | Compulsory stocks – Mixed<br>• COVA owns some compulsory stocks<br>• Companies own balance of compulsory stocks | Mixed – COVA stocks generally segregated. Company-held compulsory stocks generally amalgamated with commercial stocks |
| Italy | Federal reserve – Government | Held by ENI, state refining company, presumably segregated |
| | Compulsory stocks – Companies | Amalgamated with commercial stocks |
| Denmark | Compulsory Stocks – Mixed<br>• FDO owns its compulsory stocks<br>• Companies own balance of compulsory stocks | Mixed – FDO stocks generally held in segregated tankage leased by FDO. Company-held compulsory stocks are generally amalgamated with commercial stocks |

Source: International Energy Agency.

APPENDIX 3

Stock Targets and Operations

| Country | Government Stocks | Company Stocks |
|---|---|---|
| Japan | Current stocks are approximately 190 million barrels. The MITI goal is to have 50 million kiloliters (approx. 315 million barrels) in stock by mid-1990s. | Target: Currently 86 days of inland sales; prior to 1989, target was 90 days; may be reduced to 70 days as government stocks are increased. Obligations: Refiners -- approx. 72 days of average throughput of previous year; importers -- approx. 14 days of average imports of previous year; independent marketers -- approx. 14 days of average sales of previous year. |
| West Germany | Federal reserve has been struck at 54 million barrels for 10 years. An espoused long-term goal of approximately 73 million barrels has often put forward. | Target: 90 days of inland sales. Obligations: Refiners -- 90 days of average output of previous year; dependent importers -- 70 days of average imports of previous year; independent imports -- 40 days of average imports of previous year. Practice: EBV holds all but 15 days of refiner's obligation. |
| France | No government stocks. | Target: 90 days of inland sales. Obligations: Refiners and importers -- stocks of principal products equal to one-quarter of previous 12 months of inland sales. Practice: Up to one-half of the total company obligations will be held by the stock company SAGESS. |
| United Kingdom | No government stocks. | Target: 76.5 days of inland sales. Obligation: Refiners -- 76.5 days of average supply of previous year; other suppliers -- 66 days of average supply of previous year. |
| Netherlands | No government stocks. | Target: 90 days of inland sales. Obligations: Refiners -- 50 days of average sales of previous year; independent importers -- 15 days of average imports of previous year; storage corporation (COVA); 40 days of refiners' obligation and 55 days of importers' obligation, plus any additional to meet IEA obligations. |

APPENDIX 3
(continued)

| Country | Government Stocks | Company Stocks |
|---|---|---|
| Italy | Current federal reserve of 800,000 tons (approx. 6 million barrels). No plans to increase size. | Target: 90 days of inland sales. Obligations: State Electric Utility (ENEL) – 30 days of average residual fuel oil consumption or 90 days average direct imports of previous year (which ever greater); unbonded storage depots – 10% of capacity; 3rd party processors – 23 days of average exports; refiners and importers – balance of national obligation, allocated based on deliveries of previous year. |
| Denmark | No government stocks. | Target: 125 days of inland sales of the principal products. Obligations: Refiners and importers – 125 days of average sales of the previous year. Practice: Stockholding association, FDO, holds more than two-thirds motor gasoline obligation and all of the distillate and fuel oil obligation. FDO goal is to eventually hold entire company obligation. |

Source: International Energy Agency.

APPENDIX 4

Strategic Petroleum Reserve Oil Fill History

| | Fiscal Year | | Calendar Year | |
|---|---|---|---|---|
| | Year-End Inventory (million bbls) | Average Daily Fill Rate (thousand bbls/d) | Year-End Inventory (million bbls) | Average Daily Fill Rate (thousand bbls/d) |
| 1977 | 1.1 | 3 | 7.2 | 20 |
| 1978 | 49.1 | 131 | 68.5 | 168 |
| 1979 | 91.2 | 115 | 91.7 | 64 |
| 1980 | 92.8 | 4 | 107.8 | 44 |
| 1981 | 199.2 | 292 | 230.3 | 336 |
| 1982 | 277.9 | 215 | 293.8 | 174 |
| 1983 | 361.0 | 228 | 379.1 | 234 |
| 1984 | 431.1 | 191 | 450.5 | 195 |
| 1985 | 489.3 | 159 | 493.3 | 119* |
| 1986 | 506.4 | 47* | 511.6 | 41* |
| 1987 | 533.9 | 75 | 540.6 | 80 |
| 1988 | 554.7 | 57 | 559.5 | 52 |
| 1989 | 577.1 | 62 | 579.9 | 56 |

Source: U.S. Department of Energy.
Notes: *Fill rates unadjusted for oil deliveries under the 1985/1986 test sale.

## APPENDIX 5

### NAVAL PETROLEUM RESERVES

In the early part of this century, four naval petroleum reserves (NPR) were established from public lands by executive orders to assure that the U.S. navy would have adequate supplies of petroleum during wartime. The four reserves and their dates of establishment were: NPR-1, Elk Hills, California, 9/2/1912; NPR-2, Buena Vista, California, 12/13/1912; NPR-3, Teaport Dome, Wyoming, 4/30/1915; and NPR-4, on the North Slope of Alaska, a bit west of the Prudhoe Bay oil field, 2/27/1923. In addition, three naval oil shale reserves were also established by executive orders during the 1916-1924 period. However, with the enactment of the Defense Production Act of 1950, which provided the federal government with very broad powers to supply its defense needs, it was not necessary for the Navy to maintain its own separate wartime oil reserves.

Eventually, the Congress passed the Naval Petroleum Reserves Production Act of 1976 (P.L. 94-258) which transferred the administration of NPR-4 from the Department of Navy to the Department of Interior, effective 6/1/1977, and changed the reserve's name to the National Petroleum Reserve in Alaska (Title I, Sec. 102 and 103). There is no oil or gas production from this reserve.

In 1977, the Department of Energy Organization Act (P.L. 95-91; 8/4/1977) transferred the administration of NPR-1, 2 and 3 and the oil shale reserves, from the Department of Energy (Title III, Sec. 307), under whose jurisdiction they remain to this day. At NPR-1, the federal government has a 78 percent interest, or 90.3 thousand barrels per day (TBD) of crude, in gross production of 115.5 TBD (FY 1986). The other 22 percent of the unit is held by Chevron Corporation. At NPR-2, the government has only a relatively small royalty interest of 228 barrels per day (BD) derived from 1,807 bd of production from government leased properties and 3,294 bd gross from the entire Buena Vista Hills field (FY 1986). At NPR-3, the government has a 100 percent interest in crude production of 3,151 bd (FY 1986). In 1989, 96,000 barrels per day were produced from NPR-1. It is generally thought that all three reserves are producing at their MER.

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# THE STRATEGIC PETROLEUM RESERVE:

# AN OPERATIONAL PERSPECTIVE

COUNCIL ON FOREIGN RELATIONS

New York, NY

by Dr. Dennis Eklof

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This paper was prepared for a Council on Foreign Relations study group on the Strategic Petroleum Reserve made possible by a grant from The Arthur Ross Foundation.

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# THE STRATEGIC PETROLEUM RESERVE: AN OPERATIONAL PERSPECTIVE

By Dennis Eklof

This report analyzes considerations that have shaped the current design of the Strategic Petroleum Reserve (SPR) and its current capabilities.

## Conclusions

- Many of the issues about the SPR's ability to perform as planned are a reflection of basic design decisions made at the outset of the program and motivated by the single-minded goal of building up strategic stocks as quickly as possible.
- Within the limitations of the basic design, great progress has been made toward ensuring that the SPR will meet its original objectives.
- Wherever technically and economically feasible, the system has been tested and meets its design goals.
- Major areas that are critical to the successful use of the SPR, the most important of which is logistics, cannot be effectively evaluated except in the case of a real supply emergency.
- There are technical and procedural limitations that virtually preclude the effective use of SPR as a buffer against short-term shortages and price spikes as occurred on the West Coast in the aftermath of the Alaskan oil spill and in New England during the December 1989 cold snap. But in any event, the SPR is meant as a "strategic reserve," not a price-buffering reserve.
- Ongoing annual operating costs to maintain the SPR at 750 million barrels are likely to be $0.16 to $0.20 per barrel in 1989 dollars. At today's oil prices, annual interest costs associated with the value of the oil in the reserve are $1.30 to $1.40 per barrel. Thus the annual cost of the SPR, once development and fill is complete, will be about $1.1 billion per year.

## The Strategic Petroleum Reserve: Goals and Legislative Background

The Energy Policy and Conservation Act, signed into law late in 1975, authorized the creation of the Strategic Petroleum Reserve (SPR) with the dual goals of protecting the U.S. economy from future supply disruptions and fulfilling the U.S. obligation under the International Energy Program. The act specified that up to 1 billion barrels of crude oil and refined products were to be stashed away as an insurance policy. What the act did not specify was how this was to be done and within what time frame. Those decisions had to await the development of a detailed SPR plan that was completed and became effective in early 1977.

One of the main goals behind the plan was to place a large quantity of oil into storage as quickly as possible -- a design goal that continues to affect SPR operations. The initial target was to have 150 million barrels in storage by December 1978 and 500 million barrels by December 1982. Neither of these goals was achieved. In June 1977, the 500-million-barrel target was advanced by two years to December 1980. In fact, the amount in storage did not exceed 500 million barrels until sometime in 1986. In May 1978, the act was again amended to increase the size of the SPR to 1 billion barrels, but the amendment included schedules and detailed plans only for the increment from 500 million to 750 million barrels.

## The Basic Design Decisions: A Compromise Between Sound Engineering, Deadlines, and Costs

Four basic decisions were embodied in the original SPR plan:

- The SPR should consist of crude oil only. The 1977 plan called for the entire SPR to consist of crude oil. There are several compelling reasons for this decision. First, some products, particularly gasoline, deteriorate over time or have specifications that vary from season to season. These refined products must be periodically turned over -- a process that would not be possible within the limits of the SPR's other design parameters. Second, it was reasoned that the storage of crude provided maximum flexibility with no significant loss in security, as any interruption of product imports could be made up for by higher refinery runs in the U.S. or by processing SPR crude in offshore refineries. Third, the logistics associated with handling a variety of products rather than only two crudes (low sulfur and high sulfur) would have been much more complex. Finally, the sources of products and types of products imported into the U.S. were viewed as constituting a relatively lower risk than crude imports.

- The SPR should be established in salt domes along the U.S. Gulf Coast. This decision was based both on cost considerations and on the goal of rapid SPR fill. Establishing regional reserves would have drastically increased the cost of the program as reserves in the mid-Continent, East Coast, and West Coast would have required the construction of above-ground steel or below-ground concrete storage tanks at much higher costs compared to the use of existing or new salt caverns. The recently completed SPR expansion study shows the following 1989 costs for site development of a 100 million barrel capability:

| | |
|---|---|
| Expansion of existing salt dome site | $3.50 - $4.50 per barrel |
| New salt dome site | $5.00 - $7.50 per barrel |
| East coast in-ground tanks | $8.80 - $10.50 per barrel |
| East coast above-ground tanks | $14.80 - $16.50 per barrel |

  The concentration of refineries, marine terminals, and crude pipeline junctions in the area added to the attractiveness of Gulf Coast locations.

- Oil withdrawal would be done by means of fresh water injection. The technology associated with the storage of petroleum liquids in underground salt caverns was established long before the development of the SPR. The Louisiana Offshore Oil Port (LOOP), for example, uses underground salt domes as working storage. Withdrawal of oil from these caverns relies on the fact that oil floats on water. To withdraw the oil from SPR caverns, water is pumped into the bottom of the cavern, and the growing volume of water drives oil out the top (see Figure 1). Refilling the cavern involves pumping the oil in the top and withdrawing the water from the bottom. Unfortunately, each time this cycle is repeated a certain amount of additional salt is dissolved, and eventually the walls of the cavern become too thin and the cavern can no longer be used. In situations such as the LOOP where frequent filling and emptying are planned, brine is used instead of water, thereby avoiding unwanted dissolution of the cavern. But this requires the extra cost of brine handling and storage facilities. For each barrel of oil storage, a barrel of brine storage must be provided to contain the brine when the cavern is full of oil.

  In the case of the SPR, repeated filling and withdrawal was not anticipated so the withdrawal operation was designed to rely on fresh water taken from nearby sources, thus saving the cost of building brine storage facilities. Most of the current salt caverns in the SPR were designed for a useful life of five fill cycles.

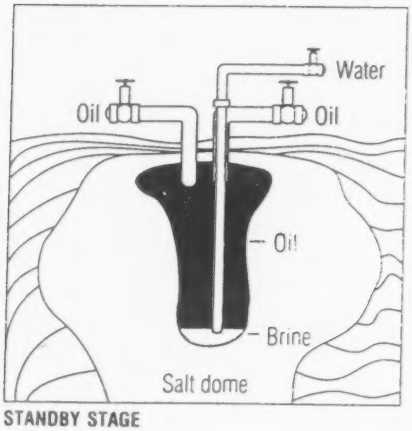
- Maximum use would be made of available existing sites. This decision was dictated by the fill targets set by Congress. New salt caverns of the size envisioned in the SPR plan -- about 10 million barrels -- can take as much as two years to develop, so existing sites had to be used wherever possible. While this decision contributed to meeting the fill goals, it required other compromises that are discussed below.

**Storage Facilities: Nearing Completion**

The SPR now consists of six separate sites grouped into three distribution systems based on site location (see Figure 2). Five of the sites are underground salt caverns, while the sixth, at Weeks Island, Louisiana, is based on totally different technology. The Weeks Island site is a

**Figure 1**

**Secure, Economical Crude Oil Storage**

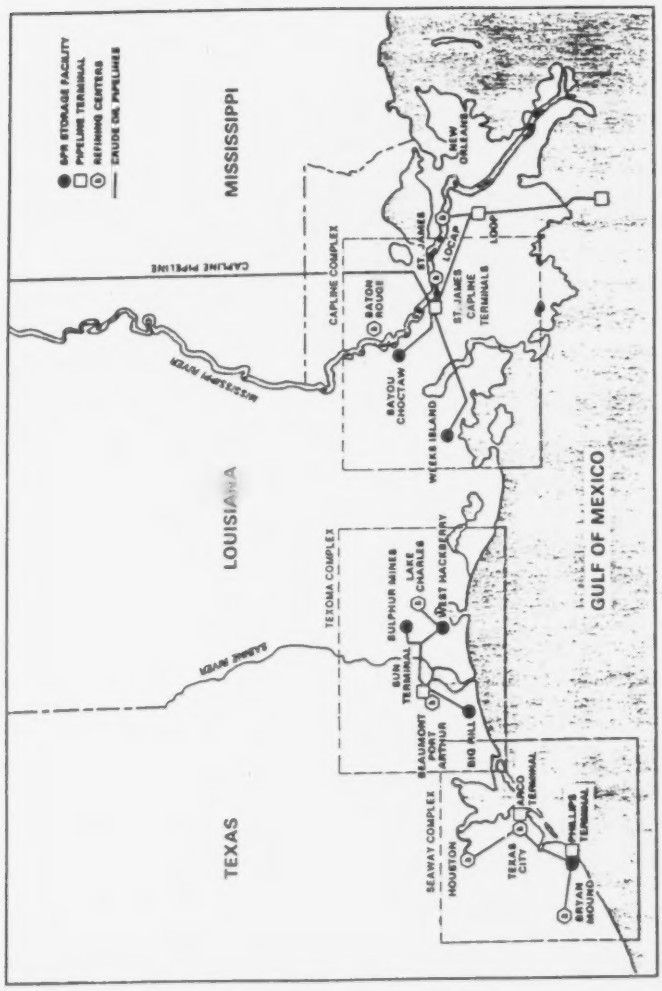



STANDBY STAGE

Source: U.S. Department of Energy.

Figure 2

Strategic Petroleum Reserve Complexes and Associated Pipelines and Terminals




Source: U.S. Department of Energy

converted, mechanically mined salt mine that was purchased from the Morton salt company. Oil is stored at the bottom of the mine (as opposed to the top of a cavern) and is withdrawn by huge submersible pumps -- a much more troublesome technology.

Surface facilities sufficient to hold the target capacity of 750 million barrels have been completed at all sites and all cavern development is complete except at Big Hill in Texas and Bayou Choctaw in Louisiana. Leaching at those two sites is scheduled for completion by 1991. One Louisiana site, Sulfur Mines, will be decommissioned in 1991. The U.S. Department of Energy (DOE) has decided that the facility is too small to be economical, so the oil will either be sold or moved to other sites. Total SPR storage capacity by mid-1990 will be about 750 million barrels.

These facilities have come a long way from the early days of the SPR when the order of the day was to find an available hole in the ground and fill it with oil. The passage of time has allowed for proper and impressive engineering of the facilities and for the upgrading of hardware and control systems to match the SPR's strategic goal. The sites visited by CERA displayed state-of-the-art control systems, well maintained equipment, extensive backup systems, and professional staffing.

**Getting the Oil to Market**

To be useful as a strategic tool, the stockpiled crude has to get to the refiner. The transportation of SPR crude is based on maximum use of commercial distribution facilities. Thus, with the exception of the DOE terminal at St. James, Louisiana, DOE ownership of distribution facilities is limited to the pipelines necessary to link the SPR sites to some critical node in the national crude oil distribution system. Distribution from that point is left to the industry. Each of the three distribution systems -- Seaway, Texoma, and Capline -- has both pipeline and tanker capabilities, as is shown in Table 1.

**Table 1**

**SPR Drawdown and Distribution Capability**
(mbd)

| | Pipeline | Marine | Withdrawal |
|---|---|---|---|
| Current | | | |
| Capline | 1.07 | 0.435 | 1.07 |
| Texoma | 0.415 | 1.09 | 1.50 |
| Seaway | 1.00 | 0.65 | 1.10 |
| **Total** | **2.485** | **2.175** | **3.57** |
| Planned | | | |
| Capline | 1.07 | 0.635 | 1.07 |
| Texoma | 0.45 | 1.77 | 2.18 |
| Seaway | 1.00 | 0.75 | 1.25 |
| **Total** | **2.52** | **3.155** | **4.50** |

Marine facilities for the Texoma and Seaway systems are provided by agreement with commercial terminal operators while the Capline system relies on DOE's St. James facility for marine access (see Figure 3).

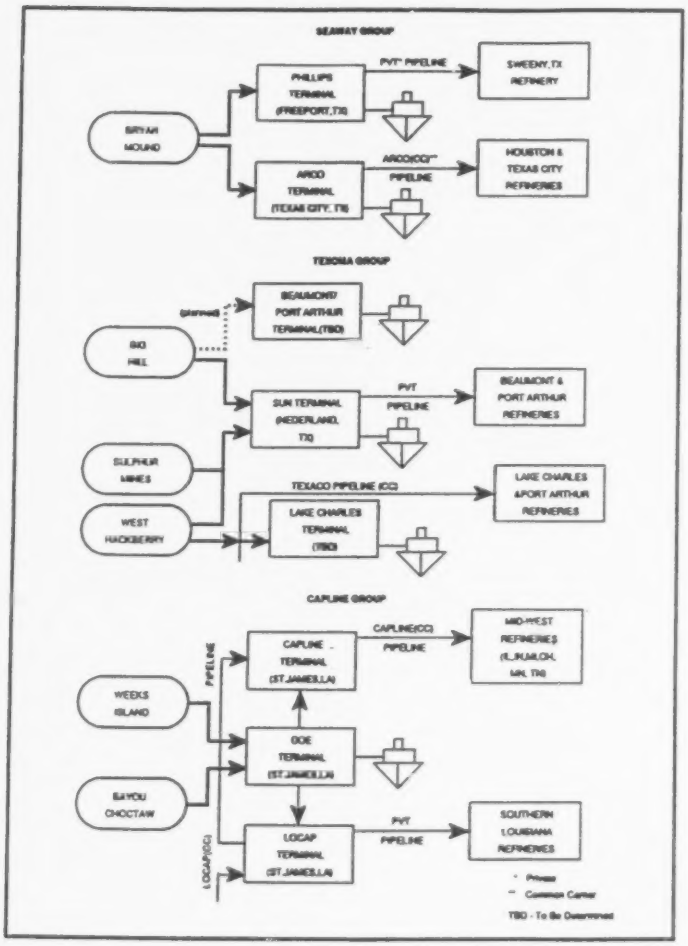
### The Burdens of Past Compromises

Despite improvements that have been made in the SPR facilities in the last decade, some of the initial system design compromises and priorities still add to the cost of the SPR and raise questions about its ability to live up to its potential. Most of these questions revolve around the decision to use facilities already in existence, particularly at the Weeks Island site.

At all of the other SPR sites, the salt caverns were formed by dissolving a cylindrical cavity in the salt by continually pumping fresh water in the cavern and removing brine until the desired size was reached. The resulting cavern is typically about 200 feet in diameter and 2,000 feet high. Access to the cavern is through two relatively small wells, not unlike shallow oil wells. The cavern is always filled with liquid, and is pressurized to about 700 pounds per square inch.

**Figure 3**

**Current and Planned Strategic Petroleum Reserve Distribution System for the Seaway, Texoma, and Capline Groups**




Source: U.S. Department of Energy.

The Weeks Island facility, as described earlier, is not a leached cavern in a salt dome, but a converted salt mine. The storage cavern was formed by conventional room-and-pillar mining techniques. As a result it provides a host of special problems.

- Since the cavern was dug by men and machines, it is open to the surface. Thus bulkheads had to be built to isolate the oil storage portions of the cavern. While development of the site was completed in 1982, additional isolation bulkheads are still being designed.
- Since the cavern is not filled with liquid at all times, the combination of air and crude together in the cavern would present a danger of explosion. To avoid this danger, an inert gas atmosphere must be maintained in the cavern.
- With leached caverns, all of the mechanical and electrical equipment is located above ground where it can be more easily monitored and maintained. At Weeks Island, the pumps, which are critical to the drawdown process, are located deep in the mine where the ever-present salt creates serious corrosion problems. Despite redundancy in the exiting pumps, a complete alternative drawdown system will be installed by 1991.
- Full recovery of the oil will not be possible. In leached cavern storage, the fresh water that is pumped in to force the oil to the surface dissolves a portion of the salt, freeing for recovery oil that was stuck to the walls of the cavern. At the Weeks Island site, some of the oil will remain trapped in pockets and stuck to the walls of the mine. This could result in a recovery rate for this site of only 96 percent.

In addition to the problems that are unique to the Weeks Island site, the use of preexisting facilities also presents problems, albeit less formidable, at other locations.

- Use of existing equipment means less standardization of hardware and thus higher maintenance costs and potentially reduced reliability.
- Sharing physical sites with commercial operators -- the case at both Weeks Island and Bayou Choctaw -- adds to security costs and problems.
- More efficient physical locations might have been available, easing the logistics problems associated with withdrawal.

**A Well-Tested System -- To a Point**

How can an emergency system be tested when there is no emergency? This is the main foundation for most of the concerns about the ability of the SPR to perform as planned. The technology associated with storage and retrieval of oil from underground salt domes is well

established. From a facilities and technology perspective, the SPR is distinguished from the commercial use of salt dome storage by four factors:

- the size of the reserve;
- the length of inventory retention;
- its stand-by status;
- the high drawdown rate.

*System Size*

The total volume of the SPR dwarfs commercial operations. The National Petroleum Council estimates that, excluding the SPR, typical crude oil inventories in the U.S. exceed operating minimum levels by only 55 million barrels while the SPR will ultimately total 750 million barrels. Yet the SPR consists of 61 different caverns, none of which offers any particular technical challenge.

*Retention Time*

Excluding the SPR, salt domes are normally used as working storage and the retention time is short. SPR oil will remain in the cavern indefinitely. This long retention period poses some additional operating problems for the SPR, but most of these translate into minor increases in operating costs and are not of concern. Yet unanticipated problems can develop. One example of such an unexpected development concerns methane gas. The salt in which the crude oil is stored contains varying quantities of methane gas. Recently, there have been some indications that in two of the caverns some of that methane is migrating into the crude. If this proves to be the case, a situation could develop where gas separating equipment would be required at the storage site to reduce methane levels sufficiently to allow safe transportation of the crude through the pipeline system. Given the high rate of planned drawdown, this could be a major technical challenge and a large cost. Testing is under way to determine the significance and accuracy of the early

indications, and it is far from certain that the migration is even occurring. But it is a good example of the possibility of unexpected problems.

*Drawdown Rate*

The ability to achieve planned drawdown rates from individual sites for limited periods of time can be accurately evaluated. Recent tests have generally reached or exceeded designed rates of drawdown. In 1989, for example, there were successful tests of both the Bayou Choctaw and West Hackberry sites. But these tests demonstrate only a subset of the technical capabilities that will be required to meet the SPR's stated goals.

Questions about other capabilities will remain unanswered for technical and economic reasons. Limited storage tank capacity at the marine terminals and pipeline junctions linked to the system means that the drawdown tests are limited to a few hours in duration. The use of fresh water to move oil out of the caverns means that the tests must be not only relatively short in duration, but also relatively infrequent. Thus the ability of the systems to sustain planned rates of drawdown beyond a few hours cannot be tested.

This reliability concern has been recognized, and in order to help respond to it, redundancy has been built into the systems in areas that are critical for drawdown, and state-of-the-art monitoring and control systems have been installed. There is reason to believe that these capabilities will permit rapid adjustment to compensate for any system failures, but overall system reliability will remain untested until a real crisis emerges. And there is some question as to how much margin there is to accomodate unexpected problems.

*Stand-by Status*

Maintaining the reliability of the SPR hardware is made more difficult by the stand-by status of the facilities once development is complete. In a commercial system that is constantly in

use, technical information on system performance and reliability can be continuously gathered and evaluated. The system can be continually fine-tuned to operate effectively. And this experience-curve phenomenon is pervasive. Spare parts inventories are adapted to actual system performance to ensure on-hand availability of needed spares. Maintenance crews become more proficient at diagnosing and repairing problems. System operators become more experienced. Control systems and related software are debugged and improved. The staff of the SPR is making a concerted effort at climbing this experience curve through test exercises, training programs, and simulated operation. Yet there is no replacement for actual operating experience.

There is more involved in the successful performance of the SPR than the technical and operational capabilities of the storage and withdrawal systems; the crude has to get into the commercial distribution system and to the refiner. This involves a myriad of commercial and logistics operations, and it is in this area where the stand-by status of the SPR may present an even bigger challenge.

To meet the goals of the SPR in the event of a crisis, the idle facilities will have little time to change from a stand-by operation to a critical part of the U.S. supply system, moving oil in volumes equivalent to Saudi Arabia's oil exports in 1986. As an example of how formidable a task this can be, in 1989 the SPR fill rate averaged 62,000 barrels per day -- equivalent to a single 80,000 dead weight ton tanker unloaded every 10 days divided among several terminals. Only three tankers have been loaded in the entire history of the SPR. If maximum use is made of pipeline delivery capabilities, distributing 3.57 million barrels per day (the current drawdown limit) would require loading 1.8 80,000 ton tankers *each day*. In practice, many smaller ships would be used and the scheduling and operation of dock facilities would be correspondingly more complex.

And, the ships might not be immediately available. Full-scale use of the SPR almost certainly would necessitate a waiver of the Jones Act which requires that only U.S. flag ships move

goods between two U.S. ports. The existing U.S. flag crude transportation fleet could not handle the required volume of SPR crude. Currently, there is a formal agreement among the DOE, the Customs Service, and the U.S. Maritime Administration to expedite the review of a requested waiver of the Jones Act in the event of an oil supply emergency, but such a waiver would not be not automatic.

The proper functioning of the critical logistical aspects of the SPR can never be fully evaluated in advance of a crisis. The DOE is continually developing training programs, computer models that simulate operations under emergency conditions, and test exercises. Yet the very nature of the system limits pre-crisis testing and the opportunity for hands-on experience.

**Short-Term Market Disturbances and the SPR**

Using the SPR to counteract short-term price distortions such as those caused by the Alaskan oil spill and the December 1989 cold spell is not practical for two reasons.* First, the absolute minimum time needed to get SPR oil to refiners would be 16 days. In practice, it would take longer, and additional time would be involved in refining the crude and getting the product to consumers. Second, repeated use of the salt caverns using fresh water for drawdown would eventually destroy the caverns.

**Ongoing Costs: Hard to Estimate**

Ongoing costs to support the SPR are difficult to predict. It has been estimated that an annual budget of $120 million will be needed once the facilities are fully developed and the full 750 million barrels has been purchased. This would cover the necessary costs of maintaining the facilities in a stand-by status, providing security forces, administration, etc. Yet there are additional costs.

*In fact, the December 1989 shortage was due to problems in the refining and product transportation sectors of the industry, *not* crude supply.

The facility may never be free from the need for capital investment. As the U.S. oil market changes, the SPR must continually adapt if it is not to become obsolete. Changes in Seaway and Texoma systems have proved examples of this need. These systems were designed to get crude to refiners through connections to the crude oil pipelines bearing the same names. Today, however, the Seaway and Texoma crude oil pipelines do not exist. Declining oil demands in the 1980s prompted the conversion of these pipelines to natural gas, and the SPR was forced to develop alternative means of distribution. New pipelines were built by the DOE to connect these two systems to alternative outlets.

Another cost is that associated with holding the inventories. Assuming a current market value of the crude of $17 per barrel, the oil currently in the SPR has a market value of $9.75 billion and an annual interest cost at 7 percent of $680 million. Thus the stand-by operating cost of the SPR will be at least $800 million annually, or about $1.40 per barrel.